2020

Institutional investors, controlling shareholders and corporate activities : evidence from China

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INSTITUTIONAL INVESTORS, CONTROLLING SHAREHOLDERS AND CORPORATE ACTIVITIES: EVIDENCE FROM CHINA

A thesis submitted in fulfilment of the

requirements for the award of the degree

DOCTOR OF PHILOSOPHY

from

UNIVERSITY OF WOLLONGONG

By

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Bachelor in Finance (University of Science and Technology Beijing, China)

Master in Finance (University of Science and Technology Beijing, China)

SCHOOL OF ACCOUNTING, ECONOMICS AND FINANCE

13 January 2020

CERTIFICATION

I, Dan Zhang, declare that this thesis, submitted in partial fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Accounting, Economics and Finance, Faculty of Business, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. This document has not been submitted for qualifications at any other academic institution.

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13 January 2020

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ACKNOWLEDGEMENTS

During my PhD study, I have appreciated all the kind help from many people.

First and most importantly, I would like to express my sincere thanks to my principal supervisor, Dr. Xiaofei Pan for his patient guidance, constant support and encouragement which have pushed forward the completion of this thesis. Since I commenced my study, he has been providing me with plenty of assistance during the research including helping decide the research topic, advising about the design of each study and guiding during the preparation of the thesis for publication. His quick responses to my emails and countless phone calls made the writing of this thesis go smoothly. Moreover, he always encouraged me to present my research work at many academic conferences and seminars, which improved my self-confidence in doing academic presentations. In addition, his expertise and dedication to academic research inspired me to be a quality researcher in the future.

As well, I would like to sincerely thank my co-supervisor, Dr. Shiguang Ma who has provided me with plenty of assistance throughout my study. At the early stage of my research, his immense knowledge helped me a lot in the development of the research idea and kept me in the right direction. When this study was prepared for submission to journals, his insightful discussions and thoughtful advice were of great help for the improvement of the quality. Without his invaluable guidance and professional comments, this thesis would not be in the present form. In addition, he is a considerate and conscientious person, and I have to say that he is not only my supervisor in doing research but also a mentor in my life.

I also would like to thank Professor Sandy Suardi and Associate Professor Corinne Cortese for their generosity in sponsoring me to attend the AFAANZ Doctoral Symposium in 2018. Special thanks to Dr. Searat Ali, who offered me a teaching opportunity and shared a lot of teaching experience with me. This made my first teaching experience successful. Thanks to Professor Terry Walter for his comments and suggestions on my research when I was doing presentations in the faculty. Also, thanks to all the other members from the Faculty of Business for their kind help in many ways.

Last but not least, many thanks go to my beloved parents, my sisters and my husband. I would like to thank my parents for their constant support wherever I am and my sisters who have been taking good care of my parents so that I was able to focus on my study abroad. I am grateful to my husband, who is also my best friend and who has been accompanying me to get through tough times during my PhD study.

ABSTRACT

Institutional investors have been evolving significantly in China since 1997 when they were formally introduced to China's market. The influence of institutional investors on firm policies has been studied extensively (Hartzell and Starks, 2003; Koh, 2007; Yuan et al., 2008; Crane et al., 2016; Firth et al., 2016; Dyck et al., 2019). These studies mainly focus on the level of ownership by institutional investors, however they do not consider the influence of the controlling shareholders. In China's firms, ownership is highly concentrated, and the controlling shareholders usually dominate the decision-making in firm policies. Therefore, the behaviours of institutional investors could be influenced by the controlling shareholders and could be related to their ability to compete with the controlling shareholders. This thesis examines the influence of large controlling shareholders on institutional investor behaviour and addresses the question: In China, what is the effect that institutional investors have on firm policies in the presence of the large controlling shareholders?

Firstly, this thesis investigates the effects of institutional investors on firm overall corporate governance measured by CEO pay-performance relationship. Secondly, this thesis examines the influence of institutional investors on firm investment activities, specifically, the innovation performance. Finally, this thesis provides insights into their demand for accounting conservatism. Due to the different investment incentives of domestic institutional investors and foreign institutional investors, their impacts may be heterogeneous. Therefore, this thesis examines the effects of domestic mutual funds and qualified foreign institutional investors (QFIIs) separately and more importantly, compares their effects.

With respect to the effects of institutional investors on firm overall corporate governance as measured by CEO pay-performance relationship, this thesis finds that the presence of domestic mutual funds can strengthen the positive pay-performance relationship, while QFIIs have no significant effects. These results indicate that domestic mutual funds could efficiently discipline managers' behaviours and thereby improve overall corporate governance, while QFIIs could not exert significant influence on corporate governance. Moreover, the effects of domestic mutual funds are stronger when they ownership level is closer to that of the controlling shareholders, and are also stronger in non-state-owned enterprises (Non-SOEs), firms with a weaker industry tournament, and firms located in more developed regions.

For firm innovation performance, both domestic mutual funds and QFIIs have positive effects. Their effects are not only determined by their ownership level, but also by their ability to contest with the controlling shareholders. It is found that when the ownership of domestic mutual funds is closer to that of the controlling shareholders, the contestability of the controlling shareholders is strengthened and this can enhance firm innovation. However, QFIIs do not have as significant contestability effects on firm innovation. Furthermore, the effects of contestability by domestic mutual funds are stronger in non-SOEs, firms without politically connected CEOs, firms facing more competitive markets and firms with less analyst coverage.

It has been documented that accounting conservatism could mitigate agency problems between managers and shareholders, so equity investors usually demand conservative accounting, treating it as a governance device. However, as evidenced, domestic mutual funds could efficiently monitor managers' behaviours in direct ways, therefore they may be less dependent on financial numbers to discipline managers.

Moreover, in China the large controlling shareholders usually adopt a lower level of accounting conservatism. In this context the requirement of institutional investors for conservative accounting would be weaker. The results show that domestic mutual funds have negative effects on accounting conservatism, whereas QFIIs have positive effects. Their effects are also subject to their relative ownership level to the controlling shareholders. The negative effects of domestic mutual funds and positive effects of QFIIs on accounting conservatism are stronger when their ownership level is closer to that of the controlling shareholders. Also, their influence on accounting conservatism is more significant in non-SOEs, firms with a higher ownership concentration and a lower level of information asymmetry.

Overall, the monitoring role of domestic mutual funds is more efficient than that of QFIIs in China. Their effects are not only relevant to their ownership level, but more importantly are related to their ownership difference to the controlling shareholders. These results imply that the behaviour of institutional investors is subject to their identities, the controlling ownership, and the institutional environment.

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ABBREVIATIONS

CSRC	China Securities Regulatory Commission
PBC	People's Bank of China
SAFE	The State Administration of Foreign Exchange
NACSSEF	National Council for Social Security Fund
SAMB	State Asset Management Bureau
OECD	The Organisation for Economic Cooperation and Development
QFIIs	Qualified Foreign Institutional Investors
CEO	Chief Executive Officer
MLS	Multiple Large Shareholders
NPC	The National People's Congress
CPPCC	The Chinese People's Political Consultative Conference
SOEs	State Owned Enterprises
CSR	Corporate Social Responsibility
MSCI	Morgan Stanley Capital International
SHSE	The Shanghai Stock Exchange
SZSE	The Shenzhen Stock Exchange
ST	Special Treatment
CSMAR	China Stock Market and Accounting Research Database
OLS	Ordinary Least Square
PSM	Propensity Score Matching
US	United States
HHI	Herfindahl–Hirschman Index
GDP	Gross Domestic Product

LIST OF PUBLICATIONS

The following publications are derived from this thesis:

Refereed Journals

Zhang D., Ma, S., Pan, X., 2019. Institutional investors, controlling shareholders and CEO pay-performance relationship: Evidence from China. Accounting and Finance.

Refereed conference proceedings

Zhang D., Ma, S., Pan, X., Institutional investors, controlling shareholders and CEO pay-performance relationship: Evidence from China. Financial Markets and Corporate Governance Conference, 19-21 April 2017, Wellington, New Zealand.

Zhang D., Ma, S., Pan, X., How do institutional investors affect firm innovation in the presence of controlling shareholders? Evidence from China. Financial Markets and Corporate Governance Conference, 16-18 April 2019, Sydney, Australia. (It is “Reject and Resubmit” with Journal of Banking and Finance)

Zhang D., Ma, S., Pan, X., Institutional investors, controlling shareholders and Accounting conservatism: Evidence from China. Asian Finance Association Annual Meeting, 7-9 July 2019, Ho Chi Minh, Vietnam. (Submitted to Journal of Corporate Finance)

LIST OF AWARDS

1. The International Postgraduate Tuition Award (IPTA), conferred by Faculty of Business, University of Wollongong, Australia, and PhD scholarship conferred by Chinese Scholarship Council (July 2016).

2. Best Paper Award, conferred by Financial Market & Corporate Governance Conference (April 2019). A paper jointly worked with Dr. Xiaofei Pan and Dr. Shiguang Ma.

3. Best Paper Prize, conferred by Faculty of Business HDR conference, University of Wollongong, Australia (September 2018). A paper jointly worked with Dr. Xiaofei Pan and Dr. Shiguang Ma.

Chapter 1 Introduction

1.1 Motivation and research questions

During the past two decades, institutional investors have evolved substantially in the capital market and are playing an increasingly important role in affecting firm policies. Academics have paid considerable attention to the role that institutional investors play in the investee firms and have provided comprehensive empirical evidence. Compared with individual investors, institutional investors are more professional and sophisticated in collecting and processing information (Hartzell and Starks, 2003; Jiang and Yuan, 2018). In addition, institutional investors are holding a relatively large percentage of shares and their investment portfolios are more diverse. With these advantages, institutional investors have incentives and capacity to influence a firm's policies, such as dividend policy, earnings management, firm valuation, corporate social responsibility and firm performance (Short et al., 2002; Hartzell and Starks, 2003; Koh, 2007; Yuan et al., 2008; Ramalingegowda and Yu, 2012; Aghion et al., 2013; Crane et al., 2016; Firth et al., 2016; De-la-Hoz and Pombo, 2016; Dyck et al., 2019).

However, these studies mainly focus on the level of institutional ownership without considering the presence of the large controlling shareholders. It should be noted that unlike developed markets, ownership is highly concentrated in emerging markets and the large controlling shareholders usually play a dominant role in deciding firm policies for their own benefits. The behaviours of institutional investors, usually the non-controlling shareholders, may be affected by the large controlling shareholders. Little attention has been given to the influence of the large controlling shareholders in emerging markets. The motivation for this thesis is to fill this void by examining

whether institutional investors could play an effective monitoring role and make some difference in emerging markets, and whether and how their effects are influenced by the controlling shareholders.

This thesis focuses on the Chinese market, which is motivated by its unique emerging market institutional characteristics including a highly concentrated ownership structure, fast development, various types of institutional investors, and the large variation in institutional ownership. First, China has become the second largest economy in the world after the US, but it is still a representative emerging market. China has the unique institutional characteristics of emerging markets including the underdeveloped financial market, highly concentrated ownership structure, weak investor protection, and low level of law enforcement, which together may shape the incentives and behaviours of institutional investors. The findings drawn from China's market could provide some implications for other emerging markets. More importantly, there exist large controlling shareholders in China's listed firms including the government and families. This is the setting for the investigation of whether the effects of institutional investors in the investee firms are subject to the ownership level of the large controlling shareholders. Second, during the last two decades, institutional investors have been growing quickly in China's capital market. There are various types of institutional investors with various owner identities such as mutual funds owned by local private entities, qualified foreign institutional investors (QFIIs) owned by foreigners, and other institutional investors that are usually owned by the government including banks, brokers, social securities and pension funds. These owners each have different investment incentives. The differences are particularly important for domestic and foreign institutional investors. Domestic institutional investors, such as mutual funds, are sophisticated and informed about the local firms, so they are able to have an

impact on firm performance or firm dividend policies (Yuan et al., 2008; Firth et al., 2016). However, foreign institutional investors are faced with language and cultural barriers, which yield more severe information asymmetry (Kang and Kim 2010; Chakravarty et al., 1998; Liu et al., 2014; Luong et al., 2017). Thus, it is this variety in institutional investors in China that enables the different types of institutional investor to be examined. Third, the large variation of institutional ownership facilitates the investigation of the influence of their ownership relative to the largest controlling shareholders.

Chapter 2 is the first study of this thesis, which is about the effects of institutional investors on CEO pay-performance relationship. Recent studies about the effects of institutional investors are mainly focused on firm policies that benefit institutional investors directly, such as earnings management (Sakaki et al., 2017; Kim et al., 2016) and dividend policy (Firth et al., 2016), and it is reported that institutional investors could have some influence on these policies. However, it is unknown whether institutional investors could improve overall corporate governance to benefit all the minority shareholders, particularly in the emerging market of China where investor protection is weak and the financial market is underdeveloped. In addition, to obtain private benefits through expropriation, controlling shareholders are less likely to align the interests of top executives and minority shareholders. With the presence of large controlling shareholders, institutional investors' effects on corporate governance may not be straightforward. Therefore, by employing an important corporate governance indicator, CEO pay-performance relationship, this thesis first provides insights into the effects of institutional investors on overall corporate governance particularly in the presence of large controlling shareholders.

Chapter 3 is the second study of this thesis. It investigates the effects of control contestability by institutional investors on firm innovation performance. This investigation aims to detect the role that institutional investors play in disciplining managers' investment behaviours and promoting economic development. In the last decade, China's economy has been growing faster and it has aimed to be an innovative country. Institutional investors are professional in processing information and hold diverse portfolios; this makes them more likely to evaluate a firm's performance from a long-term perspective and be less afraid of risk from firm investment failure. Hence, institutional investors intend to have some influence on firm innovation. However, in China, the effects of institutional investors on firm innovation may not be as straightforward as in developed markets: The underdeveloped financial market hampers firms' ability to access external funds (Fan et al., 2011; Jiang et al., 2017); and because of the lack of diversification, the large controlling shareholders are reluctant to invest in innovative projects bearing any risk (Minetti et al., 2015). Studies on multiple large shareholders (MLS) have shown that institutional investors may form control contestability of the controlling shareholders and thereby improve firm innovation. Thus, the effect of institutional investors on firm innovation may be subject to their ability to contest with the controlling shareholders. Furthermore, based on the controlling shareholders' identity, China's firms can be divided into two types: state owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs). The result of severe government intervention is that the investment activities are highly subject to government policies, and this is more severe in SOEs. Against this background, this thesis uses firm patent numbers as a measure of firm innovative performance, and then examines the influence of institutional investors' contestability on firm innovation.

Chapter 4 is the third study of this thesis, which examines the effects of institutional investors on firm accounting conservatism. Firm accounting conservatism could benefit shareholders by mitigating agency problems (Ahmed and Deullman, 2007; Lara et al., 2016) and reducing managers' ability to overstate financial performance (Watts 2003a). These benefits motivate institutional investors to demand high accounting conservatism as a corporate governance device. However, institutional investors are able to discipline managers' behaviour by taking advantage of their professional knowledge in processing information. Therefore, whether institutional investors still rely on conservative accounting to conduct their monitoring on managers is worth investigating. In addition, the high concentration of ownership makes the interest conflict between the controlling shareholders and other investors dominate in China's firms. The controlling shareholders are usually dominant in firm policy making. Since controlling shareholders have incentives to lower accounting conservatism for their private benefits, accounting conservatism could be more beneficial to other investors such as creditors. Therefore, the demand of institutional investors for accounting conservatism could be influenced by the large controlling shareholders. This thesis thus is motivated to further look into the influence of institutional investors on accounting conservatism in the presence of large controlling shareholders in China.

Based on the statement above, it is essential to investigate the role that institutional investors play in the large emerging market of China where there exists a high level of ownership concentration, different types of controlling shareholder, a large variation in institutional ownership, an underdeveloped financial market, and weak investor protection. The following section summarises the institutional characteristics in China and how they could shape the behaviours of institutional investors.

1.2 Institutional background

1.2.1 Development of institutional investors

Since the establishment of two stock exchanges, Shanghai Stock Exchange and Shenzhen Stock Exchange in the early 1990s, the Chinese government has been trying hard to stabilise the stock market and promote its development. These two stock exchanges have developed into comprehensive exchanges with trading of A-shares, B-shares, indices, funds, fixed income products and diversified derivative financial products. It is only about two decades since institutional investors emerged in China and they have now become important market participants. In 1997, the government issued the '*Interim measures for the administration of securities investment funds*', which aimed to protect the rights of fund stakeholders and formally allowed institutional investors to trade common shares on the two stock exchanges. This document was replaced with '*The measures for the administration of securities investment funds*' (amended 2012) by China Securities Regulatory Commission (CSRC)[1]. Since then, domestic mutual funds have grown quickly in terms of number of fund management companies and total capitalization. Specifically, there were only 10 fund management companies managing 23 mutual funds at the end of 1999, while by the end of 2018, the number of fund management companies had increased to 120 managing 5,626 mutual funds[2]. Domestic mutual funds are now playing a "pillar role" of institutional investors in China. The average mutual fund ownership for China's listed firms is around 4.2%. In Figure 1.1, it is shown that there is a notable increase in the number of firms which have domestic mutual funds as shareholders.

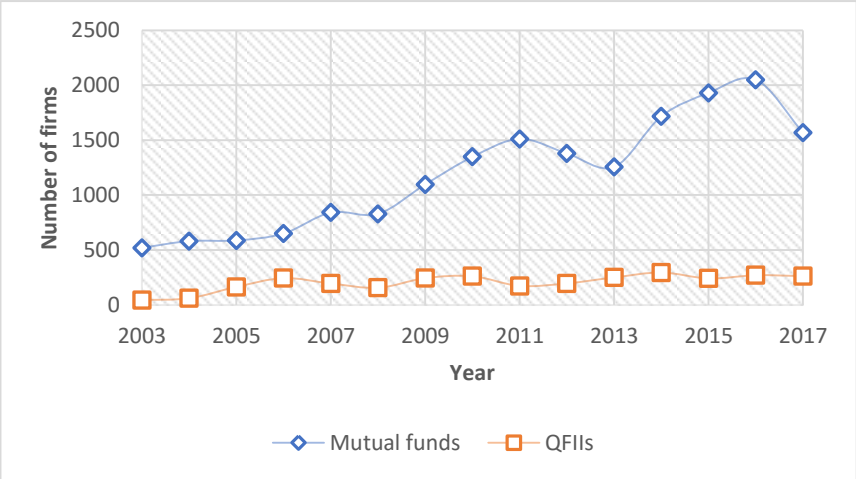
[1] Please see the link: http://www.csrc.gov.cn/pub/newsite/flb/flfg/bmgz/jjl/201402/t20140226_244348.html.

[2] The mutual funds statistic data are announced by the Asset Management Association of China. Please see the link: http://www.amac.org.cn/tjsj/xysj/jjgssj/index.shtml.

Mutual funds are generally sophisticated with professional knowledge and are able to collect and process firm information (Ferreira and Matos, 2008; Boone and White, 2015; Doidge et al., 2015; Ferreira et al., 2017). Many studies have extensively examined shareholder activism by institutional investors in both developed markets and emerging markets (Gillan and Starks, 2000; David et al., 2001; Hartzell and Starks, 2003; Yuan et al., 2008; Helwege et al., 2012; Chan et al., 2014; Firth et al., 2016; Cvijanović et al., 2016; Moreno et al., 2018; Li et al., 2019). These studies evidenced that domestic mutual funds have strong activism in improving corporate governance and influencing firm policies, such as reducing the incidence of modified audit opinions (Chan et al., 2014), enhancing managerial efficiency and the quality of corporate decision-making (Yuan et al., 2009), increasing forced CEO turnover (Helwege et al., 2012) and improving corporate social responsibility (Li et al., 2019).

Figure 1.1 Number of firms with mutual funds and QFIIs as shareholders

This figure illustrates the number of firms that have mutual funds or QFIIs as shareholders in each year.



To further promote the development of the stock market, improve the corporate governance of listed firms, and regulate investment activities, in 2002 the People's Bank of China (PBC, the central bank in China) and China Securities and Regulatory

Commission (CSRC) jointly issued the '*Measures for the administration of domestic securities investment of Qualified Foreign Institutional Investors (QFIIs)*' (amended in 2006)[3]. In 2003, qualified foreign institutional investors (QFIIs) were formally introduced to the Chinese stock exchanges and since then they have increased substantially. There were only 49 QFIIs at the end of 2007, while by May 2012 this number had increased to 138, and further increased to 312 by August 2019[4]. The growth of QFIIs in China has experienced several stages with strict regulations from the Chinese government in terms of ownership held in listed firms and their overall investment quota. In principal, the ownership held by a single QFII in a listed firm is not allowed to exceed 10%, and the total ownership of all the QFIIs in a listed firm is not allowed to exceed 30%[5]. By the end of 2018, the total investment quota was restricted to 150 billion USD, and this had doubled to 300 billion USD in January 2019[6]. However, this strict regulation was released in September 2019 when the State Administration of Foreign Exchange (SAFE) announced the scrapping of the QFIIs investment quota, indicating the free flow of QFII investment[7]. The average QFII ownership for China's listed firms is around 1.3%. Meanwhile, as indicated in Figure 1.1 above, the number of investee firms of QFIIs has been increasing since they were introduced. Existing literature shows that the foreign institutional investors also have the strong incentives to exert monitoring due to their independence from local

[3] Please see the link: http://www.csrc.gov.cn/pub/newsite/flb/flfg/bmgz/jjl/201012/t20101231_189872.html.
[4] The QFIIs statistic data are available on web page of China Securities Regulatory Commission and State Administration of Foreign Exchange. Please refer to the following links: http://www.safe.gov.cn/safe/2007/1209/4380.html, http://www.safe.gov.cn/safe/2012/0520/4771.html and http://www.csrc.gov.cn/pub/zjhpublic/G00306205/201511/t20151106_286098.htm.
[5] Please see details in Measures for the Administration of Qualified Foreign Institutional Investors (2012) at: http://www.csrc.gov.cn/pub/newsite/flb/flfg/bmgf/jj/hgjw/201310/t20131021_236658.html.
[6] Please see: http://www.xinhuanet.com/english/2019-02/01/c_137790411.htm.
[7] Please see: http://www.xinhuanet.com/english/2019-09/16/c_138396063.htm.

management and expertise in monitoring firms (Aghion et al., 2013; Luong et al., 2017; Rong et al., 2017; Bena et al., 2017).

In addition to domestic mutual funds and QFIIs, there are other types of institutional investors simultaneously and actively investing in the Chinese stock market including banks, insurance companies, social security funds, brokers, entrust companies, and financial companies. These institutional investors mainly emerged in the early 2000s. For example, the insurance companies' investment funds were allowed to enter the market after the issue of '*Interim measures for the administration of insurance companies' security funds investment'* in 1999 by the China Insurance Regulatory Commission[8]. In November 2000, the National Council for Social Security Fund (NACSSEF) was established to manage the social security fund. In 2001, the Ministry of Finance of the People's Republic of China and the Ministry of Labour and Social Security[9] jointly issued the *'Interim measures for the administration of national social security fund investment'*[10], which formally allowed the social security fund to enter the market. The investment of the social security fund is strictly constrained that for one particular fund manager, it is not allowed to invest more than 10% of the managed assets in one company[11]. The average aggregated ownership by these institutional investors is 2.8%. Since these institutional investors are usually controlled by the government, they are therefore mostly passive investors that hold their ownership due to business connections with firms. In line with the *Commercial Bank law*[12], since 2003,

[8] In 2018, China Insurance Regulatory Commission was merged with China Banking Regulatory Commission to become China Banking and Insurance Regulatory Commission.
[9] In 2008, the Ministry of Labour and Social Security was merged with the Ministry of Human Resources to become the Ministry of Human Resources and Social Security of the People's Republic of China.
[10] Please see the link: http://www.ssf.gov.cn/cwsj/ndbg/201204/t20120425_3978.html .
[11] Please see the regulation in *'Interim measures for the administration of national social security fund investment*' from the following link:
http://www.scio.gov.cn/32344/32345/33969/34130/xgzc34136/Document/1466812/1466812.htm.
[12] Please see the details at the website of
http://www.cbrc.gov.cn/chinese/home/docView/1E9378107B6B42FC8585E53381303A8F.html

banks are not allowed to hold the common shares of listed firms in China, so banks can only hold shares that are pledged by firms as collateral for bank loans, and these shares are forced to be disposed in two years.

In summary, there are three main types of institutional investors based on the identities of owners. The first type is domestic mutual funds that are owned by domestic non-government institutions, the second type is QFIIs that are owned by foreign investors, and the third type includes all the other domestic institutional investors such as brokers, banks, insurance companies, social security funds, entrust and financial companies. Since these institutional investors have different characteristics including investment objectives and owner identities, and are faced with different regulations, it is expected that their influence in the investee firms will differ.

This thesis aims to compare the effects of domestic institutional investors and foreign institutional investors in China where there exists high ownership concentration. Domestic mutual funds have incentives and are able to influence firm policies, because they are familiar with the investee firms, and are also sophisticated investors who have professional knowledge in collecting and processing information. Compared with domestic mutual funds, QFIIs are faced with more information asymmetry because they have different culture and language with that in China (Liu et al., 2014; Luong et al., 2017). QFIIs thus may not be able to influence firm policies efficiently as domestic mutual funds. Other institutional investors (such as banks and insurance companies etc.) have very weak incentives to monitor managers or influence firm policies, given that they are dependent institutional investors with business ties with the investee firms. For example, banks are only allowed to hold shares that are pledged by firms as collateral for bank loans in case of default, and these shares are forced to be disposed within two

years (*Commercial Bank law*). Therefore, this thesis will compare the different effects of domestic mutual funds and QFIIs on corporate activities, and will incorporate the effects of other institutional investors in a later section in empirical analysis.

1.2.2 Ownership structure in China

In 1978, an economic reform commenced in an attempt to introduce a market-oriented economy to replace the centrally planned economy. As the main part of the reformation, state-owned enterprises (SOEs) were transformed from traditional SOEs into profitable and modernized enterprises. Before this period, all of China's firms were controlled by the central government. Since the reformation commenced, state ownership has been gradually released and SOEs are becoming joint-stock companies with private entities and foreign investors holding some ownership. To improve investment efficiency, in early 1980, the government adopted the "loan for (fiscal) grant" (bo gai dai) scheme, the process in which the government reduces free funding but makes loans to enterprises. This scheme hardens the budget constraints faced by SOEs and further makes SOEs be market-profit oriented.

In the early 1990s, the Shanghai stock exchange and Shenzhen stock exchange were established. Since then, SOEs have been further privatised by issuing shares to the public and being listed on the stock exchanges. According to the regulations of the Chinese Securities Regulatory Commission (CSRC), the listed firms on these two stock exchanges are allowed to issue three types of shares: state shares, legal person shares, and public common shares. The state shares are converted from state-owned assets, which are under the control of the State Asset Management Bureau (SAMB). Legal person shares are held by institutions which were owners of the listed firms before they are listed on the stock exchange. Both state shares and legal person shares were non-

tradable, except in some special situations until 2005, when split share structure reform was launched. This reform aimed to transform non-tradable shares into tradable shares, and most of the firms had finished this reform before 2007. Public common shares traded on China's two stock exchanges include A-shares and B-shares, which are initially issued to Chinese residents and foreign investors, respectively. Another type of common shares is H-share, which are issued by domestic Chinese companies on the Hong Kong Stock Exchange. Chinese people on the mainland were not allowed to trade H-shares before 2014 when the Shanghai-Hong Kong Stock Connect was introduced. Since then, institutional investors on mainland China have been allowed to trade H-shares.

Ownership in China's firms is highly concentrated and there exist largest shareholders and controlling shareholders. In most cases, the controlling shareholder controls the firm directly, so the controlling shareholder is just the largest shareholder. In some other cases, the controlling shareholders control the firm indirectly through a pyramid structure. For example, company A holds 60% of the ownership of company B and company B holds 50% of company C. In this situation, company A is the controlling shareholder of company C. Company A owns 50% of the control rights of company C, and 30% of cash flow rights of company C.

In China, as many listed firms are reformed SOEs, but the state is still the ultimate controlling shareholder. Among the three types of shares introduced above, the state and legal persons own about one-third each of capitalization in the domestic market, and the remaining capitalization is owned by a large number of individuals and institutions. Although legal persons own a similar proportion of the market capitalization with the state, it does not mean they are controlling shareholders because the ownership of legal

persons is an aggregated value. Thus, the most important type of controlling shareholders in China's listed firms is the state. The proportion of firms under the control of the state is around 50%. The other types of controlling shareholders include families (25%), individuals (13%), co-founders (7%), collectives (3%) and private institutions (1%). The remaining 1% are widely held firms. The average ownership held by the controlling shareholders in the sample is 36%, with the maximum value of 89%. Therefore, controlling shareholders usually have incentives to monitor CEOs and dominate decision-makings in firm policies (Firth et al., 2006; Cao et al., 2011). Moreover, they have the incentives to pursue private benefits and expropriate from other shareholders to enjoy private benefits of control (Faccio and Lang, 2002; Claessens et al., 2002; Maury and Pajuste, 2005; Faccio et al., 2011; Jiang et al., 2018).

In addition, the controlling shareholders are concentrated on industries. State-controlled firms are primarily concentrated on the electronic power and coal, aerospace and military, and machinery industries, which are all considered to have political and strategic importance for the central Chinese government. Other industries such as high-tech and catering industries are mainly privately controlled by families, co-founders, and collectives etc. Foreign institutional investors have a preference for state-controlled sectors due to the lower requirement for local knowledge, while the portfolios of domestic mutual funds are distributed more evenly (Liu et al., 2014).

In China, institutional investors are not controlling shareholders given the lower level of their ownership. Both domestic mutual funds and QFIIs are controlled by non-government entities, and other types of the institutional investors are controlled by the government related entities.

1.3 Methodology and key findings

The main methodology used in this thesis is empirical analysis. The sample consists of all the listed firms on the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE). All the required data are obtained from the Chinese Stock Market and Accounting Research (CSMAR) database, which is a frequently used data source for studies on corporate governance in the Chinese market (Fan et al., 2007; Firth et al., 2016; Zhang et al., 2016). Specifically, institutional ownership data are derived from the "Institutional Investor" section, firm innovation data are from the "Listed Firm's Patents" section and all the required data for calculating firm accounting conservatism are collected from the "China Listed Firms Research Series" section.

1.3.1 Institutional investors, CEO pay-performance relationship

Chapter 2 tests the effects of institutional investors on the CEO pay-performance relationship by firstly constructing a linear regression model. The dependent variable is the natural logarithm of CEO's total cash compensation including salary, bonus and other cash compensation. The key independent variables include the ownership of domestic mutual funds and the ownership of QFIIs. To examine the effects of the controlling shareholders on institutional investors' behaviour, two continuous variables are constructed: one is the ratio of domestic mutual funds' ownership to the controlling shareholders' ownership; the other is the ratio of QFIIs' ownership to the controlling shareholders' ownership. To illustrate the effects of institutional investors on the CEO pay-performance relationship, the interactive term between mutual funds' ownership and firm performance measured by return on assets ratio (ROA) as well as the interactive term between QFIIs' ownership and ROA are included in the model. The coefficients of these two interactive variables indicate the impact of domestic mutual

funds and QFIIs respectively on the CEO pay-performance relationship. The estimation method of the main regression is a firm fixed-effects model to address the concern that there may be some unobservable firm-level characteristics. Secondly, to test the effects of state ownership on institutional investors' monitoring on managers, the main regression model is re-estimated using subsamples of SOEs and non-SOEs. To test the potential channels through which institutional investors influence CEO pay-performance relationship, the main regression model is further re-estimated in firms with good or poor corporate governance by employing industry tournament as a proxy for corporate governance. To test whether the influence of institutional investors is dependent on the development of the legal system and investor protection, the prime question is examined in both more developed and less developed regions. Thirdly, a change regression model, Heckman two-stage method and propensity score matching (PSM) method are employed to address endogenous issues.

Chapter 2 finds that domestic mutual funds' ownership has positive effects on CEO pay-performance relationship and the positive effects are stronger when their ownership is closer to the controlling shareholders' ownership. However, QFIIs have no significant effects on CEO pay-performance relationship. It is also evidenced that the improvement of corporate governance is an important channel through which domestic mutual funds positively affect CEO pay-performance relationship.

1.3.2 Institutional investors and firm innovation

Chapter 3 examines the effects of institutional investors' contestability of the controlling shareholders on firm innovation performance by employing firm patent data as the measure of firm innovation. In the empirical regression model, the dependent variable is firm innovation, represented by the natural logarithm of the number of firm

patent applications. The key independent variables are contestability by mutual funds and QFIIs. To measure contestability, this thesis firstly uses the ratio of institutional investors' ownership level to that of the controlling shareholders. Secondly, this thesis uses ownership dispersion as a proxy for contestability by institutional investors. The ownership dispersion is defined as the difference in ownership level between controlling shareholders and mutual funds (or QFIIs) divided by the sum of their ownerships. For the main regression model, the ordinary least square (OLS) method is initially employed as the estimation method. The coefficients of these contestability measures reflect the influence of institutional investors on firm innovation performance. To test the robustness of the main results, this chapter further re-estimated the main regression model using alternative firm innovation measurements: the Heckman two-stage method, the propensity score matching (PSM) method, and change regressions are applied to mitigate endogenous concerns.

Chapter 3 finds that the effects of institutional investors on firm innovation are not only determined by their ownership level but also subject to their ability to contest with the controlling shareholders, i.e. contestability of the controlling shareholders. Domestic mutual funds' contestability has positive effects on firm innovation, while QFIIs have no such contestability effects.

1.3.3 Institutional investors and firm accounting conservatism

Chapter 4 examines the effects of institutional investors on firm accounting conservatism. Following previous studies (Chen et al., 2013; Cullinan et al., 2012), the method developed by Khan and Watts (2009) is applied to calculate accounting conservatism, namely *C_Score*. After the accounting conservatism (*C_Score*) data are obtained, a regression model with *C_Score* as the dependent variable, institutional

ownership as the independent variable and other control variables is constructed. The method to measure the influence of the controlling shareholders is the same as that in Chapter 3. To mitigate the concern that there may be some unobservable firm-level characteristics, a firm fixed-effects model is applied as the estimation method. Furthermore, to mitigate endogenous concerns, the PSM method and 2SLS model are employed.

The study finds a significant negative relationship between domestic mutual funds' ownership and accounting conservatism, while the QFIIs' ownership is positively related to accounting conservatism. The negative effects of domestic mutual funds and the positive effects of QFIIs are both stronger when their ownership level is closer to that of the controlling shareholders. Additional evidences suggest that the negative effects of domestic mutual funds and positive effects of QFIIs are stronger in non-state-owned firms, firms with higher level of ownership concentration and lower level of information asymmetry.

1.4 Contributions

This thesis contributes to existing literature in several ways. Firstly, it adds to the extant literature by examining the effects of institutional investors on firm policies in emerging markets. Previous studies on the effects of institutional investors are mainly focused on developed countries (Hartzell and Starks, 2003; Aghion et al., 2013; Ramalingegowda and Yu 2012); this thesis provides insights into China, the largest emerging market. It provides evidence on whether institutional investors can exert influence on investee firms against the background of high ownership concentration, weak investor protection and in an emerging market.

Secondly, this thesis advances the understanding of the effects of institutional investors in China. The results indicate that in China, the influence of institutional investors is not only determined by their ownership level, but also is subject to the difference of their ownership to that of the controlling shareholders. Specifically, this thesis find that when the ownership level of domestic mutual funds is closer to that of the controlling shareholders, domestic mutual funds have incentives to contend with the controlling shareholder in monitoring managers through strengthening the CEO pay-performance relationship, and in improving firm innovation performance. At the same time, their incentives to lower firm accounting conservatism become stronger.

Thirdly, this thesis adds to the corpus of studies investigating the behaviours of institutional investors by discussing the heterogeneity of domestic institutional investors and foreign institutional investors. The empirical evidence shows that domestic mutual funds are professional in processing information and have information advantages. This enables them to have an effective monitoring role on managerial behaviours by strengthening the CEO pay-performance relationship and improving firm innovation investment. Furthermore, due to their ability to monitor managers directly, they are less dependent on financial numbers and high accounting conservatism. In contrast, due to cultural and language barriers, foreign institutional investors are faced with more server information asymmetry, so their direct monitoring role is less effective and thus they tend to require high accounting conservatism.

Finally, this thesis gives a practical understanding of the role of institutional investors in investee firms in the context of China.

1.5 Structure of this thesis

This thesis consists of five chapters: Chapter 1 is introduction, which describes the motivation for this research, research questions, related institutional background, methodology, key findings and contributions. Chapters 2 to 4 present the three main studies. Specifically, chapter 2 examines whether and how institutional investors could improve corporate governance by using CEO pay-performance relationship as an indicator. The findings from this chapter answer the question: whether institutional investors could play an effective monitoring role in improving corporate governance and strengthening CEO pay-performance. Chapter 3 examines the effects of institutional investors' contestability of the controlling shareholders on firm innovation. Aghion et al. (2013) documented that in the US, institutional investors could improve firm innovation. This chapter aims to answer this question for the Chinese market that has large controlling shareholders who are reluctant to invest in innovative projects (Minetti et al., 2015). Chapter 4 examines the demand of institutional investors for accounting conservatism.

Chapters 2 to 4 commence with an introduction of the research question, followed by a background summary and the proposed hypotheses before the empirical analysis is presented. Following hypotheses, some basic statistics are presented for the key variables used in the empirical analysis. The hypotheses are examined by employing regression analyses. Some robustness tests are carried out and endogenous issues are addressed following the main regression results. Chapter 5 provides some conclusions drawn from this thesis and summarises suggestions for future research.

Chapter 2 Institutional investors, controlling shareholders and CEO pay-performance relationship

2.1 Introduction

This chapter examines the effects of institutional investors on CEO pay-performance relationship in the emerging market of China. Over the past few decades, the growth of institutional investors has become a global phenomenon and they play an important role in mitigating information asymmetry and monitoring managers[13]. This role became even more prominent after the 2008 global financial crisis when institutional investors were required to exert their influence on management proposals including those related to CEO compensation (OECD, 2009).

Since then, a number of studies have revealed explicit evidence on the roles played by institutional investors in developed markets. They show that institutional investors are effective monitors and can mitigate information asymmetry[14]. Meanwhile, other studies have examined the roles of institutional investors in emerging markets and document that institutional investors can affect firm performance/valuation (Yuan et al., 2008; Lin and Fu, 2017), the quality of financial reporting (Chan et al., 2014), firm innovation (Rong et al., 2017) and dividend policy (Firth et al., 2016; Cao et al., 2017). However, to the best of my knowledge, it is still unclear whether institutional investors could discipline managers' behaviors and influence the overall corporate governance in the interests of all the other minority shareholders. It is expected that this issue might be more prominent and relevant in emerging markets. On the one hand, the institutional

[13] See, for example, Hartzell and Starks (2003), Aggarwal et al. (2005), Shin and Seo (2011), Helwege et al. (2012), Boone and White (2015), Bena et al. (2017) and Chen and Keung (2018).
[14] See, for example, Koh (2007), Ferreira and Matos (2008), Boehmer and Kelley (2009), Fich et al. (2015), Cornett et al. (2007) and Borochin and Yang (2017).

environment is still underdeveloped and investor protection legislation is weaker in emerging markets. Thus, whether the expected functions of institutional investors can be ensured is unclear, as these concerns directly shape the incentives and behaviors of institutional investors. On the other hand, ownership concentration is usually a prevalent aspect in emerging markets, and controlling shareholders usually make the final decisions regarding firm policies. Institutional investors may have been captured by controlling shareholders and thus their independence is compromised, so their monitoring role is no longer as straightforward.

This chapter empirically investigates whether and how institutional investors monitor CEO compensation in China, the largest emerging market. This investigation is motivated by several strands of literature. First, a series of studies suggest that institutional investors can potentially affect corporate compensation schemes (Hartzell and Starks, 2003; Croci et al., 2012; Cheng et al., 2015; Golebiowska and Urbanek, 2016), and these impacts are different due to differing investment horizons, the cost of monitoring, and the business relationships with their portfolio firms (Chowdhury and Wang, 2009; Shin and Seo, 2011; Zhu et al., 2017). Since these studies mainly focus on developed markets, it is really unknown whether it is the case in China with poor investor protection and prevailing ownership concentration.

Second, it has been argued that the role of shareholders is mainly attributed to their identities (Shleifer and Vishny, 1997; Cronqvist and Fahlenbrach, 2008; Lin et al., 2011), so a more rigorous investigation of institutional investor heterogeneity is required. In China's stock markets, there are various kinds of institutional investors with different ownership identities, such as private institutions, governments, and foreign institutions. This setting can thus provide a sufficient tension where the different

monitoring roles exerted by various types of institutional investors can be investigated.

Third, existing studies document that if firms have several shareholders with substantial ownership, they have the incentive to monitor the controlling shareholders to reduce the associated expropriation and moral hazard activities (Bennedsen and Wolfenzon, 2000; Laeven and Levine, 2008; Jiang et al., 2018). However, it is unclear whether the effectiveness of monitoring by other large shareholders can be attributed to the identities of controlling shareholders. Chinese listed firms can be divided into state-owned enterprises (SOEs) and non-SOEs, and these controlling shareholders have different incentives for monitoring CEO compensation (Kato and Long, 2006; Cao et al., 2011). In the spirit of these studies, this chapter further investigates how institutional investors respond to controlling shareholder's ownership.

It has been argued that CEO compensation incentives are not only determined by observed CEO characteristics, but also determined by unobserved characteristics such as CEO psychological traits and personality. Coles and Li (2016, 2018) further document that these unobserved CEO characteristics can better explain the variations of CEO pay-performance sensitivity. Therefore, to address this concern, a firm-fixed effects model is employed as estimation method in the empirical analysis. Using a sample of Chinese listed firms from 2005 to 2015, the following findings are obtained. First, the presence of domestic mutual funds can strengthen the relationship between CEO pay and firm accounting performance (measured by ROA), and such positive effects are stronger when their ownership becomes closer to that of the controlling shareholders. However, Qualified Foreign Institutional Investors (QFIIs) wield no significant effects on the CEO pay-performance relationship. Second, empirical results show that the positive effects of domestic mutual funds are more pronounced in non-

SOEs than in SOEs, particularly the central government controlled SOEs. Third, additional analysis reveals that the positive effects of domestic mutual funds are stronger in firms located in more developed regions or in firms with weaker industry tournament, which supports the assertion that mutual funds strengthen the CEO pay-performance relationship by improving corporate governance. The overall results are robust when taking the potential endogeneity into consideration and using alternative measures of executive compensation.

This chapter makes several contributions to the literature on this topic. First, over the last decade many studies have examined shareholder activism by institutional investors in developed markets (Smith 1996; Cvijanović et al., 2016; Gillan and Starks, 2000). There are also a large number of studies investigating the influence of institutional investors in emerging markets (e.g., Yuan et al., 2008; Firth et al., 2016; Lin and Fu, 2017; Rong et al., 2017). However, these studies on emerging markets only examine the effects of institutional investors' activism on firm performance or firm policies (e.g., dividend policy) that could benefit institutional investors directly (Firth et al., 2016). As a complement to their studies, this chapter examines how institutional investors affect corporate governance, in particular the CEO pay-performance relationship in China. Moreover, studies from developed countries or international markets document that foreign institutional investors have a positive effect on enhancing corporate governance (Ferreira and Matos, 2008; Luong et al., 2017), whereas this chapter finds some contrasting evidence that QFIIs exert no significant effect on corporate governance in China due to its different and unique culture (a relationship-based economy), different dialects and government intervention in the economy. This study therefore advances the understanding of the real effects that domestic and foreign institutional investors have on corporate governance.

Second, this work builds on literature that examines shareholders' influence on corporate governance (Laeven and Levine, 2008; Attig et al., 2009). By focusing on the institutional investors who are usually non-controlling shareholders, this chapter provides direct evidence that their influence on the CEO pay-performance relationship depends largely on their relative ownership to controlling shareholders, which is consistent with arguments made by Firth et al. (2010) and Huang and Zhu (2015). This chapter finds that the monitoring effects of institutional investors depend on their ownership, as well as the difference in ownership compared to controlling shareholders.

Third, this study also adds to literature that examines the effect of identity of shareholders on the CEO pay-performance relationship (Kato and Long, 2006; Conyon and He, 2011). From the perspective of ownership types, this chapter examines the effects of institutional investors by distinguishing different types of owners because this is relevant to their behaviours and provides evidence of how comprehensive institutional investors work in emerging markets.

The remainder of this chapter is organized as follows. Section 2.2 develops hypotheses. Section 2.3 introduces the data and method of analysis. Section 2.4 presents the main empirical results. Section 2.5 reports the results after addressing endogeneity issues and other robustness tests and finally, section 2.6 draws some conclusions.

2.2 Hypotheses development

2.2.1 Institutional investors and CEO pay-performance in China

In the spirit of Shleifer and Vishny (1997), the incentives and behaviours of institutional investors depend largely on their identities. It is thus of great significance to distinguish the types of institutional investors for investigating their effects in the

investee firms (Borochin and Yang, 2017). According to the descriptions in the section 1.2.1, this chapter mainly identifies both domestic mutual funds and QFIIs.

It has been well documented that institutional investors serve the monitoring role in mitigating the agency problem between managers and shareholders, thus improving the CEO pay-performance sensitivity (Hartzell and Starks, 2003; Almazan et al., 2003). Domestic mutual funds in China are controlled by domestic private institutions whose main objective is to maximize portfolio returns. Moreover, domestic mutual funds are becoming large, better-informed and more active shareholders. Therefore, domestic mutual funds are similar to their counterparts in developed markets and are able to exert influence on firms' decisions. It is expected that domestic mutual funds have positive effects on the CEO pay-performance relationship for the following several reasons.

First, domestic mutual funds do not have business connections with their portfolio firms, so their monitoring activities are less sensitive to pressure and face less conflict of interest with their portfolio firms (Yuan et al., 2008; Liu et al., 2014). Thus, domestic mutual funds have strong incentives to restrain managerial opportunistic behaviours and impose a strong dependence of CEO pay on firm performance (Cornett et al., 2007). Moreover, since domestic mutual funds hold a relatively large percentage of shares, they can also place more exit threat on investee firms by voting with their feet. For this reason, the board prefers to make decisions that favour mutual funds.

Second, the compensation of mutual funds' managers is not only related to their funds' size but also linked to the incremental value of their funds' assets (shares), which directly reflect the performance of the investee firms. So mutual funds' managers are concerned about the performance of their investee firms and are likely to impose disciplinary activities over CEOs.

Third, professional skills in analyzing information enable investors to influence firms (Borochin and Yang, 2017; Jiang and Yuan, 2018). Domestic mutual funds are considered to have expertise and are professional in gathering and processing information. Their professional information processing helps mitigate information asymmetry between managers and shareholders, which makes it easier for shareholders to monitor managers' behavior (Hartzell and Starks, 2003). There is a suspicion that transient investors have short investment horizons and consequently are unlikely to collect and analyze firm information. However, this chapter argues that transient investors could benefit from private information, as collecting/analyzing private information enables them to trade ahead of firm-specific news and gain from short-term price movements or avoid sudden loss (Boone and White, 2015).

Fourth, domestic mutual funds have reputational concerns because they are usually expected to be monitors in firms. It is generally agreed that a weaker association between CEO pay and firm performance signals a weak corporate governance and poor monitoring system towards the stock markets. Therefore, a weaker relationship between CEO pay and firm performance may lead to the reputational detriment of domestic mutual funds. To protect their reputation, domestic mutual funds tend to strengthen the CEO pay and performance relationship, so the following hypothesis is formed:

H1a: Domestic mutual funds have positive effects on the CEO pay-performance relationship.

With respect to QFIIs which are owned by foreigners, it has been extensively documented that they are also effective monitors of firm management by providing more sophisticated knowledge and advanced management skills (Ferreira and Matos, 2008; Huang and Zhu, 2015; Firth et al., 2016; Bena et al., 2017). However, because

QFIIs are less familiar with the unique institutional environment of China, such as relationship-based economy, many regional dialects spoken and different accounting standards (Liu et al., 2014; Zou et al., 2016; Luong et al., 2017), they do not have the ability to handle issues with their invested firms in comparison with their domestic counterparty – domestic mutual funds. It is proposed that the expected significant and beneficial effects of QFIIs on enhancing the positive relationship between CEO pay and firm performance could be seriously compromised for the reasons set out below.

First, unlike developed countries, information asymmetry is severe in China's market due to both insider control and weak requirement for disclosure (Yuan et al., 2009). In the spirit of Bae et al. (2008) and Ferreira et al. (2017), foreign investors may be less informed about China's firms than domestic investors. Coupled with the fact that the Chinese language is not spoken worldwide (Liu et al., 2014), QFIIs are less efficient at processing and comprehending information and thus face more severe information asymmetry when investing in China.

Second, the Chinese economy is highly controlled by the central and local governments and imbedded within a culture traditionally based on relationships, which means that the key element to success in business is to build and maintain a relationship with government (Shen et al., 2019; Li et al., 2017; Wu et al., 2012; Liu et al., 2014). Unlike domestic investors, it is harder for foreign investors to cooperate with China's regulators or establish valid connections with government representatives, and this may undermine their expected efficient monitoring. If these two reasons are combined, QFIIs may have a weaker effect on enhancing the CEO pay-performance relationship. This chapter has the following hypothesis:

H1b: QFIIs may have weaker effects on the CEO pay-performance relationship.

Moreover, an evolving literature on multiple large shareholders (MLS) asserts that other large shareholders can serve efficient monitoring in curbing the expropriation by controlling shareholders, achieved through forming coalitions with other large stakeholders or competing for control by attracting minority shareholders. This becomes stronger when the ownership held by these large shareholders is closer to the ownership held by the controlling shareholders (Bennedsen and Wolfenzon, 2000; Maury and Pajuste, 2005; Laeven and Levine, 2008; Attig et al., 2008, 2009; Mishra, 2011; Ben-Nasr et al., 2015; Jiang et al., 2018). In China, ownership of a business is usually concentrated in the hands of controlling shareholders, and domestic mutual funds are usually other large shareholders. Thus, the monitoring influence of domestic mutual funds is also subject to the balance of power between their ownership and that of controlling shareholders. Following the MLS literature, this chapter conjectures that when domestic mutual funds present as one of the large shareholders and hold closer ownership to that of the controlling shareholders, they are more likely to monitor the CEO pay-performance relationship better. Therefore, this chapter puts forward the following hypothesis:

H2: The positive effect of domestic mutual funds on the CEO pay-performance relationship is stronger when the difference in ownership between domestic mutual funds and the controlling shareholders decreases.

2.2.2 The effect of institutional investors in SOEs and non-SOEs

According to the above discussion, the effect of institutional investors is more likely to be captured by controlling shareholders, so this chapter also conjectures that the effects that institutional investors have on the CEO pay-performance relationship are subject to the types of controlling shareholders. Chinese listed firms can be divided into

state-owned enterprises (SOEs) and non-SOEs (Peng et al., 2017). SOEs are controlled by different levels of government (Kong et al., 2019). Multi-task theory contends that SOEs function more like the institutions of governments and seek to achieve multiple objectives such as improving production, maintaining social stability and keeping employment (Chang and Wong, 2009; Fan et al., 2013). Therefore, CEO pay in SOEs does not dependent solely on firm performance, which weakens the relationship between CEO pay and firm performance. Moreover, CEOs in Chinese SOEs have other incentives to consider such as political promotion which also weakens the relationship between CEO pay and firm performance. However, non-SOEs are controlled by private sector entities who strive to maximize firm value and face less government intervention when making decisions (Chen et al., 2011). This requires a stronger relationship between CEO pay and firm performance in non-SOEs, which provides sufficient incentive for CEOs to perform well.

In addition, since 1978, Chinese SOEs have experienced a series of privatization and corporatization reforms when the government awarded sufficient autonomy to enterprises and relinquished its control over some SOEs to a large extent. Consequently, SOEs are becoming market-oriented and aim to maximize profitability, and compensation of executives in SOEs is becoming more aligned to profits and sales. However, this is more likely to be the case in those SOEs controlled by the local governments (Chen et al., 2009; Cao et al., 2011), rather than in those SOEs controlled by the central government. In particular, central SOEs are still under the absolute control of the government which has certain political and strategic objectives, such as maintaining its monopoly over some sensitive industries. So their CEO compensation incentives are determined by the government, and less likely to be influenced by the institutional investors. In this sense, it is expected that institutional investors can affect

the CEO pay-performance relationship in local SOEs, but have no effect on the CEO pay-performance relationship in central SOEs. Therefore, the following hypothesis is formed:

H3: The influence of domestic mutual funds on the CEO pay-performance relationship is stronger in non-SOEs than in SOEs, particularly than in central government controlled SOEs.

2.3 Data and methodology

2.3.1 Data and sample selection

The sample of empirical analysis includes firms listed on the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) from 2005 to 2015. The sample year starts from 2005 when individual executive compensation began to be disclosed in annual reports, but only the total compensation received by the top three executives was reported before 2005. From the total population of firms, this chapter excludes those flagged with ST and *ST (Special Treatment), firms from the finance industry and firms with missing information. The final sample consists of 1,960 firms and 15,613 firm-year observations. All the data are collected from the Chinese Stock Market and Accounting Research (CSMAR) database.

2.3.2 Institutional investors and ownership measurements

Empirically, three dimensions are applied to measure institutional investors' ownership. First, to denote whether a firm has institutional investors as common shareholders, two dummy variables are created, *Mutuald* and *QFIId*, which are equal to 1 if a firm has domestic mutual funds and QFIIs as the common shareholders, respectively, and 0 otherwise. Second, to denote the level of ownership held by

institutional investors, two continuous variables are created, *Mutual* and *QFII*, which are defined as the percentage of ownership held by domestic mutual funds and QFIIs, respectively. Third, to denote the difference in ownership between institutional investors and controlling shareholders, two continuous variables are created, *Mutualratio* and *QFIIratio*, which are defined as the ratio of ownership held by domestic mutual funds and QFIIs to the ownership held by the controlling shareholders, respectively. The higher these two ratios are, the smaller the difference in ownership between institutional investors and controlling shareholders is.

2.3.3 Model

In the empirical analysis, the following regression equation is used to examine the effects of institutional investors on the CEO pay and firm performance relationship, which is reflected by the coefficients of interactive terms:

$$\begin{aligned} CEOpay_{i,t} = {} & \beta_0 + \beta_1 Mutual_{i,t} + \beta_2 QFII_{i,t} + \beta_3 ROA_{i,t-1} + \beta_4 Mutual_{i,t} * ROA_{i,t-1} \\ & + \beta_5 QFII_{i,t} * ROA_{i,t-1} + \beta_6 Otherins_{i,t} + \beta_7 Asset_{i,t} + \beta_8 Leverage_{i,t} + \beta_9 Board_{i,t} \\ & + \beta_{10} Indep_{i,t} + \beta_{11} Controlling_{i,t} + \beta_{12} CEOage_{i,t} \\ & + Dummy(year) + \varepsilon_{i,t} \end{aligned} \tag{2.1}$$

where *CEOpay* represents the compensation of CEOs as measured by the natural logarithm of CEO's total cash compensation, which is the sum of salary, bonus and other cash compensation. *Mutual* and *QFII* represent domestic and foreign institutional ownerships, respectively, which are discussed in section 2.3.2. *ROA* is return on assets calculated as the ratio of net income to total assets, which serves to measure firm performance. To reflect the logical influence of performance on CEO pay, this chapter uses one-year lagged performance as an independent variable in the regression analysis

so that the sample size for the regression analysis should be reduced. β_4 and β_5 are used to test the main hypotheses. According to the previous discussions, β_4 is expected to be significantly positive and β_5 is expected to be insignificant.

To consider the effects of other variables on CEO pay, a set of control variables is also included, namely firm total asset level, leverage ratio and board characteristics. Table 2.1 lists the definitions of all the variables in this model. *Otherin* is the sum of ownership of all the other types of institutional investors. *Asset* is the natural logarithm of the total assets. *Leverage* is leverage ratio, defined as total debts over total assets. *Board* is the natural logarithm of the number of board directors. *Indep* is the proportion of independent directors on the board. *Controlling* is the number of shares owned by the controlling shareholder. *CEOage* is the age of the CEO. Year dummies are also included to control for time-series effects. According to the studies by Coles and Li (2016, 2018), unobserved CEO characteristics also have significant effect on CEO pay-performance relationship. Thus, the equations are estimated with firm fixed effects to address this issue.

It is acknowledged that the current literature also uses delta to measure the CEO pay-performance sensitivity (Coles et al., 2006; Babenko, 2009; Dang et al., 2018). However, in the sample of Chinese firms, there are only 127 firms granting stock options to CEOs. Due to the small sample disproportionate the investigated population, the results using delta to measure the CEO pay-performance sensitivity could not be meaningful. Moreover, the data obtained from the CSMAR database is limited, so for this reason, it is unlikely to calculate the value of stock options using the Black-Scholes model indicated by the delta definition. In addition, it has been argued that Chinese stock market is influenced by various factors including government manipulation,

which makes stock price too noisy to measure firm performance (Pan and Mishra, 2018). Therefore, the delta is not used in this chapter to measure the CEO pay-performance sensitivity.

Table 2.1 Variable Definition

Variables	Definition
Panel A: Executive compensation and age	
CEO pay	The natural logarithm of CEO compensation
CEO age	The age of CEO
Panel B: Institutional ownership	
Mutual	The ownership percentage of domestic mutual funds in a firm.
QFII	The ownership percentage of QFIIs in a firm
Otherins	The sum of ownership of other types of institutional investors (including banks, insurance companies, social security funds, brokers, trust companies, and financial companies) in a firm.
Mutuald	A dummy variable that is equal to 1 if the firm has domestic mutual funds as shareholders and 0 otherwise
QFIId	A dummy variable that is equal to 1 if the firm has QFII as shareholders and 0 otherwise
Mutualratio	Ratio of domestic mutual funds' ownership to the largest shareholder's ownership
QFIIratio	Ratio of QFIIs' ownership to the largest shareholder's ownership
Panel C: Firm characteristics and corporate governance	
Board size (Board)	The natural logarithm of the number of directors on the board
Independent directors (Independent)	Proportion of independent directors on the board
Leverage	Total debts/total assets in book value
Asset	The natural logarithm of total assets
Controlling	Percentage of shares owned by the controlling shareholders
Tobin's Q	Market value/replacement value
Panel D: Firm performance	
Return on assets (ROA)	Net income/total assets
Stock Return (RET)	Firm annual stock return

2.4 Empirical Results

2.4.1 Summary statistics

Table 2.2 provides summary statistics of the sample. The statistics are reported in separate panels. Specifically, Panel A reports summary statistics for executive characteristics. Panel B reports summary statistics of firm institutional ownership. Panel C reports summary statistics for firm characteristics and corporate governance. Panel D reports summary statistics for firm performance. Panel E reports firm distribution.

Table 2.2 Summary statistics

Variable	Obs.	Mean	Std.Dev.	Median	Min	25%	75%	Max
Panel A: Executive characteristics								
CEO pay	15,613	480,899	299,482	403,000	120,000	233,454	680,000	1,056,000
CEO age	15,613	47.825	5.205	48	40	43	52	56
Panel B: Institutional ownership								
Mutual* (%)	9,501	4.189	4.468	2.52	0.02	0.88	6.06	33.416
QFII* (%)	1,548	1.254	1.263	0.88	0.01	0.44	1.63	12.468
Otherins* (%)	10,228	2.87	4.076	1.68	0.025	0.71	3.56	73.03
Mutualratio* (%)	9,501	14.389	20.028	7.183	0.035	2.443	18.187	330.198
QFIIratio* (%)	1,548	4.101	5.598	2.394	0.012	1.068	4.968	68.430
Mutuald	15,613	0.627	0.484	1	0	0	1	1
QFIId	15,613	0.099	0.299	0	0	0	0	1
Panel C: Firm characteristics and corporate governance								
Board Size	15,613	9.057	1.828	9	3	8	9	19
Independent	15,613	3.274	0.664	3	1	3	4	8
Leverage (%)	15,613	48.068	20.200	48.927	5.660	32.946	63.288	99.861
Asset (million)	15,613	4,890	4,840	2,810	720	1,360	6,560	15,700
Controlling (%)	15,613	36.602	15.503	34.655	2.197	24.210	47.890	89.990
Q	15,613	1.750	0.834	1.454	0.893	1.060	2.251	3.393
Panel D: Firm performance								
ROA (%)	15,613	3.626	5.681	3.300	-27.920	1.220	6.190	20.460
RET (%)	15,613	41.591	92.095	15.03	-86.930	-11.49	70.59	142.87
Panel E: Firm type distributions								
	SOEs				Non-SOEs			
Observations (percentage)	8,922(57.145%)				6,691(42.855%)			

Panel A reports summary statistics for executive characteristics. CEO pay is the cash compensation of CEO, which has been available since 2005. Panel B reports summary statistics of firm institutional ownership. * represents the summary result of firms with positive institutional ownership. Specifically, *Mutual**, *QFII** and *Otherins** represent firms which have mutual funds, QFIIs and other institutional investors as shareholders. Panel C reports summary statistics for firm characteristics and corporate governance. Panel D reports summary statistics for firm performance. Panel E reports firm distribution. All the definitions of the variables are listed in Table 1.1 and the values of variables are in terms of China's currency, the RMB.

It is shown that the average CEO pay is 480,899 RMB, which is almost six times more than that from 1998 to 2000 (Firth et al., 2007). The average ownership of domestic mutual funds and QFIIs are 4.189% and 1.254%, respectively. These statistic results for institutional ownership are in line with Firth et al. (2016). The summary of *Mutuald* and *QFIId* shows that in the sample, 62.7% of firms have domestic mutual

funds as shareholders and 9.9% of firms have QFIIs as shareholders. This indicates that institutional ownership is quite common in the Chinese equity market. Based on average board size (9.057) and the number of independent directors (3.274), the percentage of independent directors can be obtained, which is 36.15%. The average percentage of shares held by the controlling shareholders is 36.602%, which reflects a high level of ownership concentration in Chinese firms. Moreover, the percentage of observations for non-state-owned firms is 42.855%.

2.4.2 Effects of institutional ownership on the CEO pay-performance relationship

Table 2.3 presents the results of testing the main hypotheses. Specifically, column (1) shows the results of focusing on whether there are institutional investors as shareholders. Column (2) shows the results of focusing on institutional investors' ownership, while column (3) shows the results of focusing on the difference between institutional investors' ownership and controlling shareholder's ownership. In this chapter, the interactive terms are concerned because they reflect the effects that institutional investors have on the CEO pay-performance relationship. As shown in columns (1) and (2), the coefficients of *Mutuald*ROA* (0.686) and *Mutual*ROA* (8.454) are both positive and statistically significant at the 1% level, which indicates that the presence of domestic mutual funds helps to link CEO pay to firm performance, and this effect becomes stronger when domestic mutual funds hold a larger percentage of shares. This result is consistent with hypothesis H1a. It is also found that the coefficients of *QFIId*ROA* and *QFII*ROA* are positive but insignificant, which implies that QFIIs do not have significant effects on the CEO pay-performance relationship. This is consistent with hypothesis H1b. Column (3) shows that the coefficient of

Table 2.3 Effects of institutional ownership on the CEO pay-performance relationship

Dependent variable: the natural log of CEO pay			
	(1)	(2)	(3)
Mutuald	0.012		
	(1.06)		
QFIId	-0.007		
	(-0.36)		
Mutuald*ROA	0.686***		
	(3.87)		
QFIId*ROA	0.025		
	(0.10)		
Mutual		0.310	
		(1.63)	
QFII		-0.303	
		(-0.24)	
Mutual*ROA		8.454***	
		(3.75)	
QFII*ROA		7.777	
		(0.42)	
Mutualratio			0.061
			(1.37)
QFIIratio			-0.012
			(-0.05)
Mutualratio*ROA			1.556***
			(3.38)
QFIIratio*ROA			0.024
			(0.01)
ROA	0.857***	0.970***	1.047***
	(6.10)	(7.83)	(8.63)
Others	0.110	0.149	0.139
	(0.69)	(0.92)	(0.86)
Asset	0.177***	0.186***	0.184***
	(9.60)	(10.17)	(10.08)
Leverage	-0.139**	-0.149***	-0.148***
	(-2.57)	(-2.78)	(-2.75)
Board	0.139**	0.141**	0.137**
	(2.48)	(2.52)	(2.45)
Independent	0.074	0.080	0.074
	(0.52)	(0.57)	(0.52)
Controlling	-0.069	-0.062	-0.037
	(-0.71)	(-0.64)	(-0.38)
CEOage	0.007***	0.007***	0.007***
	(4.16)	(4.21)	(4.19)
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Observations	13,028	13,028	13,028
R-squared	0.344	0.346	0.345

This table reports the effects of institutional investors on the CEO pay-performance relationship using the firm fixed-effect model. Dependent variable is the natural log of CEO compensation. *Mutuald (QFIId)* is the dummy variable, which is equal to 1 if there are mutual funds (QFIIs) as shareholders in a firm and 0 otherwise. *Mutual* and *QFII* denote ownership level of mutual funds and QFIIs, respectively. *Mutualratio* and *QFIIratio* are the ratios of mutual funds' ownership and QFIIs' ownership to the controlling shareholder's ownership, respectively. Definitions of all the other variables are listed in Table 2.1. Year dummies are included. The t-statistics (in parentheses) are computed using robust standard errors clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

*Mutualratio*ROA* is 1.556 and significant at the 1% level (t-value is 3.38), while the coefficient of *QFIIratio*ROA* is insignificant. This suggests that the previously documented strengthening effects of domestic mutual funds become even stronger when their ownership is closer to the controlling shareholder's ownership. This finding is consistent with hypothesis H2. The results concerning the relationship between control variables and CEO pay are consistent with previous studies (Firth et al., 2007).

Overall, the existence of domestic mutual funds can improve corporate governance by strengthening the CEO pay-performance relationship. When the ownership of domestic mutual funds is closer to the controlling shareholders and they are presenting as large shareholders, their influence becomes stronger as a result of the strong incentive to contend with controlling shareholders. However, due to the challenges/obstacles that are unique to China's culture (such as relationship-based economy and various languages spoken within the country), QFIIs cannot improve corporate governance due to an inability to improve their monitoring performance.

2.4.3 Effects of institutional ownership between SOEs and non-SOEs

This section tests hypothesis H3 by dividing the sample firms into SOEs and non-SOEs. A firm is identified as an SOE if the ultimate controlling shareholder is the government. Empirically, equation (2.1) is re-estimated using separate subsamples of SOEs and non-SOEs, and Table 2.4 reports the results. Specifically, columns (1) to (3) are the results of using a subsample of SOEs, and columns (4) to (6) are the results of using a subsample of non-SOEs. Again, the interactive terms are the main concerns in this section. It is observed that the coefficient of *Mutuald*ROA* is 0.533 for SOEs,

Table 2.4 Effects of institutional ownership on the CEO pay-performance relationship in SOEs and non-SOEs

Dependent variable: the natural log of CEO pay						
	SOE subsample			Non-SOE subsample		
	(1)	(2)	(3)	(4)	(5)	(6)
Mutuald	0.032**			-0.021		
	(2.24)			(-1.13)		
QFIId	0.003			-0.030		
	(0.12)			(-0.76)		
Mutuald*ROA	0.533**			0.944***		
	(2.17)			(3.60)		
QFIId*ROA	0.028			0.053		
	(0.08)			(0.11)		
Mutual		0.641***			-0.350	
		(2.69)			(-1.21)	
QFII		0.301			-1.558	
		(0.22)			(-0.62)	
Mutual*ROA		7.481**			11.926***	
		(2.40)			(3.92)	
QFII*ROA		4.434			17.361	
		(0.20)			(0.56)	
Mutualratio			0.139**			-0.067
			(2.08)			(-1.15)
QFIIratio			-0.027			-0.044
			(-0.09)			(-0.09)
Mutualratio*ROA			1.405*			2.292***
			(1.81)			(4.32)
QFIIratio*ROA			1.656			0.107
			(0.30)			(0.02)
ROA	1.194***	1.257***	1.335***	0.320	0.463**	0.545***
	(6.61)	(7.93)	(8.52)	(1.46)	(2.38)	(2.85)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,588	7,588	7,588	5,440	5,440	5,440
R-squared	0.356	0.359	0.357	0.332	0.333	0.333
	(1) vs (4)	(2) vs (5)	(3) vs (6)			
Chow test	5.205***	5.327***	5.293***			

This table shows different effects of institutional investors in SOEs and non-SOEs using the firm fixed-effect model. Dependent variable is the natural log of CEO compensation. Columns (1) to (3) are results of using SOEs as the sample and columns (4) to (6) are results of using non-SOEs as the sample. *Mutuald (QFIId)* is the dummy variable, which is equal to 1 if there are mutual funds (QFIIs) as shareholders in a firm and 0 otherwise. Mutual and QFII denotes ownership level of mutual funds and QFIIs, respectively. *Mutualratio* and *QFIIratio* are the ratios of mutual funds' ownership and QFIIs' ownership to the controlling shareholder's ownership, respectively. Control variables in equation (2.1) are included in each regression. Definitions of all the variables are the same as those in Table 1.1. Year dummies are included. The Chow tests' F statistics reveal the significance of the difference in the coefficients on *Mutuald*ROA, Mutual*ROA* and *Mutualratio*ROA* for SOEs and non-SOEs. The t-statistics (in parentheses) are computed using robust standard errors clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

which is significant at the 5% level (t-value is 2.17), and 0.944 for non-SOEs, which is significant at the 1% level (t-value is 3.60). The coefficient of *Mutual*ROA* is 7.481 for SOEs, which is significant at the 5% level (t-value is 2.40), and 11.926 for non-SOEs, which is significant at the 1% level (t-value is 3.92). These results suggest that domestic mutual funds can strengthen the CEO pay-performance relationship, and this is more significant in non-SOEs as reflected by the larger magnitude of coefficients for non-SOEs.

The different effects that domestic mutual funds have in SOEs and non-SOEs are more obvious when the difference in ownership between them and controlling shareholders is considered. In particular, column (3) shows that the coefficient of *Mutualratio*ROA* is 1.405 in SOEs, which is significant at only the 10% level (t-value is 1.81); while it is 2.292 for non-SOEs in column (6), which is significant at the 1% level (t-value is 4.32). This suggests that when the ownership of domestic mutual funds is closer to that of controlling shareholders, the incentives of domestic mutual funds to contend with controlling shareholders are stronger in non-SOEs. This is reflected by the more significant and larger coefficient of *Mutualratio*ROA* for non-SOEs. The Chow tests ($F=5.205$, p-value<0.01; $F=5.327$, p-value<0.01; $F=5.293$, p-value<0.01) reveal that the effects of domestic mutual funds on the CEO pay-performance relationship are stronger in non-SOEs than SOEs.

To further test H3, equation (2.1) is re-estimated separately using subsamples of central government controlled SOEs and local government controlled SOEs. The results are reported in Table 2.5. It is observed that in columns (1) to (3), the coefficients of all the interactive terms between mutual funds' ownership measure and ROA are insignificant. This means that mutual funds have no significant effects on the CEO pay-

Table 2.5 Effects of institutional ownership on the CEO pay-performance relationship in central government controlled SOEs and local government controlled SOEs

Dependent variable: the natural log of CEO pay						
	Central government controlled SOEs subsample			Local government controlled SOEs subsample		
	(1)	(2)	(3)	(4)	(5)	(6)
Mutuald	0.056**			0.022		
	(2.03)			(1.34)		
QFIId	-0.038			0.024		
	(-0.80)			(0.87)		
Mutuald*ROA	-0.123			0.785***		
	(-0.29)			(2.69)		
QFIId*ROA	0.233			-0.112		
	(0.39)			(-0.27)		
Mutual		0.577			0.679**	
		(1.33)			(2.37)	
QFII		-3.107			1.590	
		(-1.07)			(1.04)	
Mutual*ROA		4.944			8.396**	
		(0.78)			(2.30)	
QFII*ROA		38.960			-7.371	
		(0.85)			(-0.29)	
Mutualratio			0.200*			0.125
			(1.80)			(1.60)
QFIIratio			-1.077*			0.351
			(-1.73)			(1.08)
Mutualratio*ROA			0.078			1.821**
			(0.05)			(2.07)
QFIIratio*ROA			12.025			-1.923
			(0.86)			(-0.31)
ROA	1.406***	1.198***	1.316***	1.130***	1.250***	1.323***
	(3.93)	(3.68)	(4.13)	(5.53)	(6.89)	(7.35)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,122	2,122	2,122	5,466	5,466	5,466
R-squared	0.303	0.308	0.306	0.327	0.330	0.329

This table shows different effects of institutional investors in central government controlled SOEs and local government controlled SOEs using the firm fixed-effect model. Dependent variable is the natural log of CEO compensation. Columns (1) to (3) are results of using central government controlled SOEs as the sample and columns (4) to (6) are results of using local government controlled SOEs as the sample. Control variables in equation (2.1) are included in each regression. Definitions of all the variables are the same as those in Table 2.1. Year dummies are included. The t-statistics (in parentheses) are computed using robust standard errors clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

performance relationship in central government controlled SOEs. However, the results in columns (4) to (6) reveal that the coefficients of interactive terms between mutual

funds' ownership measure and ROA are significantly positive. This suggests that mutual funds have significant effects on the CEO pay-performance relationship in local government controlled SOEs. These results validate hypothesis H3. These results are also consistent with Firth et al. (2010) who argue that domestic mutual funds face pressure and regulation from local governments, so the effect of domestic mutual funds is mitigated and they are less likely to contend with governments in SOEs.

2.5 Endogeneity issues and robustness tests

2.5.1 Endogeneity issues

Although a firm fixed effects model has been applied to address the potential endogeneity issue, it could also be argued that institutional investors prefer investing in firms with a strong CEO pay-performance relationship, which results in reverse causality. To address this issue, this section examines changes in the CEO pay-performance relationship when institutional investors sell their holding firms ownership. This selling event is not directly related to a specific firm's pay-performance relationship. Empirically, two dummy variables are constructed, *Mutualdec* and *QFIIdec*, which are equal to 1 if the ownership of mutual funds and QFIIs decrease, respectively, and 0 otherwise. Then, equation (2.1) is re-estimated by replacing *Mutual* and *QFII* with *Mutualdec* and *QFIIdec*, respectively. Moreover, this section tests the changes occurring in pay-performance when there is a change of institutional ownership. To do so, *Mutual* and *QFII* in equation (2.1) are replaced with two new continuous variables, *ΔMutual* and *ΔQFII*, denoting the ownership change of mutual funds and QFIIs, respectively. The results are reported in Table 2.6. It is observed that the coefficient of *Mutualdec*ROA* is significantly negative, indicating that the decline in mutual funds' ownership can weaken the pay-performance relationship. In addition, the

significant positive coefficient of *ΔMutual*ROA* indicates that the increase (decrease) of mutual funds' ownership strengthens (weakens) the pay-performance relationship.

Table 2.6 Effects of institutional investors on the CEO pay-performance relationship addressing reverse causality

Dependent variable: the natural log of CEO pay		
	(1)	(2)
Mutualdec	0.015	
	(1.56)	
QFIIdec	0.023	
	(1.16)	
Mutualdec*ROA	-0.292**	
	(-1.98)	
QFIIdec *ROA	-0.212	
	(-0.94)	
ΔMutual		-0.300*
		(-1.94)
ΔQFII		-0.364
		(-0.40)
ΔMutual *ROA		7.921***
		(3.69)
ΔQFII*ROA		4.691
		(0.34)
ROA	1.309***	1.201***
	(9.86)	(10.16)
Control	Yes	Yes
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
Observations	13,028	13,028
R-squared	0.293	0.292

This table shows the effects of institutional investors on pay-performance relationship after addressing the endogenous issue of reverse causality. Column (1) shows results of examining the changes of pay-performance relationship when institutional investors sell their holding firms. Column (2) shows the results of examining the changes of pay-performance when there is a change of institutional ownership. *Mutualdec* and *QFIIdec* are dummy variables which are equal to 1 if mutual funds and QFIIs sell their holding firms, respectively, and 0 otherwise. *ΔMutual* and *ΔQFII* represent the ownership change of mutual funds and QFIIs, respectively. Definitions of all the other variables are the same as those in Table 2.1. The t-statistics (in parentheses) are computed using robust standard errors clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 2.7 Effects of institutional ownership on the CEO pay-performance (Heckman and PSM)

Dependent variable: the natural log of CEO pay						
	Heckman two-stage (second stage)			PSM method		
	(1)	(2)	(3)	(4)	(5)	(6)
Mutuald	-0.023			0.010		
	(-1.18)			(0.78)		
QFIId	0.010			-0.006		
	(0.40)			(-0.28)		
Mutuald*ROA	0.705***			0.548***		
	(3.96)			(2.72)		
QFIId*ROA	0.043			-0.038		
	(0.16)			(-0.14)		
Mutual		0.168			0.354*	
		(0.82)			(1.77)	
QFII		1.245			-0.161	
		(0.81)			(-0.13)	
Mutual*ROA		8.918***			7.400***	
		(3.96)			(3.18)	
QFII*ROA		7.352			4.463	
		(0.40)			(0.24)	
Mutualratio			0.021			0.067
			(0.45)			(1.42)
QFIIratio			0.171			0.027
			(0.58)			(0.10)
Mutualratio*ROA			1.686***			1.333***
			(3.72)			(2.84)
QFIIratio*ROA			0.270			-1.048
			(0.06)			(-0.25)
ROA	0.839***	0.954***	1.024***	1.125***	1.215***	1.312***
	(5.97)	(7.67)	(8.42)	(6.14)	(8.12)	(9.08)
$Lambda_{Mutual}$	-1.818**	-0.900*	-1.242**			
	(-2.04)	(-1.78)	(-2.54)			
$Lambda_{QFII}$	2.625	3.958*	2.411			
	(1.12)	(1.76)	(1.15)			
Control	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,028	13,028	13,028	11,206	11,206	11,206
R-squared	0.298	0.302	0.301	0.331	0.334	0.332

This table shows the effects of institutional investors on the CEO pay-performance relationship using the Heckman two-stage method and PSM. Specifically, columns (1) to (3) are results of using the Heckman two-stage method (second stage), and columns (4) to (6) are results of using PSM. Control variables in equation (2.1) are included in each regression. $Lambda_{Mutual}$ and $Lambda_{QFII}$ are inverse Mills ratios obtained from the first stage of the Heckman two-stage model. Definitions of all the variables are the same as those in Table 2.1. The t-statistics (in parentheses) are computed using robust standard errors clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Second, there is a potential issue of sample selection bias as institutional investors may prefer particular firms or industries. To address this issue, the Heckman two-stage

method is employed. The first stage involves an OLS analysis where institutional ownership is regressed against the same control variables from the main equation. To meet the exclusion restrictions, the first stage regression also includes three variables that are not included in the second-stage regression. The first two variables are the industry median level of mutual funds and QFIIs. The third variable is a dummy variable which captures the index inclusion of a firm, following Firth et al. (2016) and Rong et al. (2017). In particular, this variable is *Indexdom* which is equal to 1 if a firm is included in either the Shanghai 180 index or the Shenzhen Component index in a year and 0 otherwise. Then the inverse Mills ratios (Lambda) are obtained from the first stage and are included as independent variables in the second stage. The results are reported in columns (1) to (3) in Table 2.7, which shows a broadly consistent results with those in Table 2.3.

Third, the PSM method is used to construct a sample in which the treatment sample and control sample are similar in terms of some observed characteristics. In this matching process, for each firm-year observation in the treatment sample (i.e., observations with either domestic mutual funds or QFIIs as shareholders), an observation in the control sample is identified (i.e., observations without either domestic mutual funds or QFIIs as shareholders) which has the same/nearest propensity score of firm characteristics including firm asset level, leverage ratio, board size, board independence, the largest shareholder's ownership, and CEO age in the same year from the same industry. The results of using PSM are reported in columns (4) to (6) of Table 2.7, which are quite similar to those reported in Table 2.3, indicating that the main results are robust after considering the potential endogeneity issues using alternative estimation methods.

2.5.2 Corporate governance channel

It has been previously argued in this chapter that mutual funds strengthen CEO pay-performance by monitoring CEOs' behaviours and improving corporate governance. This section provides empirical evidence to validate that corporate governance is the

Table 2.8 Effects of institutional investors in firms with larger and smaller industry tournament

Dependent variable: the natural log of CEO pay						
	Firms with larger industry tournament			Firms with smaller industry tournament		
	(1)	(2)	(3)	(4)	(5)	(6)
Mutuald	0.001			0.010		
	(0.07)			(1.05)		
QFIId	-0.016			0.007		
	(-0.73)			(0.48)		
Mutuald*ROA	0.343			0.410**		
	(1.80)			(2.59)		
QFIId*ROA	-0.087			0.064		
	(-0.34)			(0.31)		
Mutual		0.025			0.345**	
		(0.12)			(2.03)	
QFII		-0.278			0.484	
		(-0.15)			(0.57)	
Mutual*ROA		3.292			4.486**	
		(1.34)			(2.16)	
QFII*ROA		2.488			1.026	
		(0.08)			(0.08)	
Mutualratio			-0.001			0.063
			(-0.01)			(1.48)
QFIIratio			-0.381			0.054
			(-0.82)			(0.29)
Mutualratio*ROA			0.782			0.771*
			(1.37)			(1.86)
QFIIratio*ROA			1.488			-0.108
			(0.23)			(-0.03)
ROA	0.026	0.082	0.088	0.813***	0.912***	0.970***
	(0.23)	(0.80)	(0.87)	(5.73)	(7.70)	(8.46)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,543	3,543	3,543	9,485	9,485	9,485
R-squared	0.039	0.040	0.040	0.204	0.209	0.207

This table shows the effects of institutional investors on the pay-performance relationship in firms with larger or smaller industry tournament using the firm fixed-effect model. Columns (1) to (3) are results of testing firms with larger industry tournament. Columns (4) to (6) are results of testing firms with smaller industry tournament. Control variables in equation (2.1) are included in each regression. Definitions of all the variables are the same as those in Table 2.1. Year dummies are included. The t-statistics (in parentheses) are computed using robust standard errors clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

channel through which mutual funds can affect CEO pay-performance. To measure the level of corporate governance, the industry tournament incentives are employed, since it is argued that strong industry tournament provides effective incentives for CEOs (Coles et al., 2018). In particular, this section uses the compensation gap between CEO in a firm and the highest paid CEO among firms operating in the same industry to measure industry tournament. The sample firms are then divided into two groups based on the median value of industry tournament, and equation (2.1) is re-estimated using these two subsamples and Table 2.8 reports the results. As can be seen from the results, the coefficients of interaction terms of mutual funds' ownership and firm performance are more significant in firms with less intensive product market competition and in firms with weaker industry tournament. These results support the argument that mutual funds affect CEO pay-performance via improving corporate governance.

Moreover, there may be some other potential channels through which mutual funds have influence on CEO compensation. For instance, Li et al. (2019) document that mutual funds are likely to require a stronger relationship between CEO pay and firm corporate social responsibility (CSR) outcomes, and firm CSR outcomes are determined by mutual fund's CSR score. Their study indicates that mutual funds' self-attributes affect their incentives for monitoring and improving corporate governance, which is a key channel for mutual funds to affect CEO pay-performance relationship. However, due to the data unavailability, this potential channel is not able to be tested empirically at the moment, but this chapter calls for future studies on this important issue.

2.5.3 Effects of regional development

Whether or not the function of institutional investors can be guaranteed depends mainly on the development of a legal system and investor protection. The laws and

regulations in more developed regions could be better enforced which would protect investors' interests. Moreover, information asymmetry is believed to be more severe in firms from less developed regions, which makes it difficult for institutional investors to know what is happening through investee firms and to monitor effectively. Thus, it is proposed that institutional investors have a greater effect in firms located in more developed regions. In this section, this conjecture is tested by taking advantage of the regional variations in China's economic development. The full sample is divided into firms located in more and less developed regions based on the Chinese marketization index (Fan et al., 2011) which measures the marketization levels of 31 provinces. Provinces ranking in the top 15 are defined as more developed regions and all the others as less developed.

Empirically, equation (2.1) is estimated using subsamples of firms located in more and less developed regions separately. The results are reported in Table 2.9. Consistent with the structure in Table 2.8, columns (1) to (3) are the results of using a subsample of firms located in more developed regions, and columns (4) to (6) are the results of using a subsample of firms located in less developed regions. Again, the interactive terms are the main concerns. Note that the coefficients of *Mutuald*ROA*, *Mutual*ROA* and *Mutualratio*ROA* are positive and statistically significant for firms from more developed regions, while they are insignificant for firms from less developed regions. These findings suggest that the effects of domestic mutual funds on strengthening the CEO pay-performance relationship are stronger in firms from more developed regions. It is also noted that all the coefficients of interactive terms related to QFIIs are not significant in firms from either more or less developed regions, which confirms previous findings that QFIIs have no significant effect. These results support the argument that the function of institutional investors can only be ensured when their

interests/rights are well protected, when the legal system is developed, and when regulations are properly enforced.

Table 2.9 Effects of institutional investors on the CEO pay-performance relationship across regions

Dependent variable: the natural log of CEO pay						
	Firms from more developed regions			Firms from less developed regions		
	(1)	(2)	(3)	(4)	(5)	(6)
Mutuald	0.013			0.021		
	(0.93)			(0.98)		
QFIId	0.001			-0.002		
	(0.05)			(-0.04)		
Mutuald*ROA	0.725***			0.626		
	(3.50)			(1.59)		
QFIId*ROA	-0.088			0.235		
	(-0.27)			(0.42)		
Mutual		0.329			0.165	
		(1.37)			(0.46)	
QFII		0.011			-0.951	
		(0.01)			(-0.46)	
Mutual*ROA		9.314***			5.033	
		(3.46)			(1.08)	
QFII*ROA		2.594			23.197	
		(0.11)			(0.61)	
Mutualratio			0.068			0.032
			(1.17)			(0.40)
QFIIratio			0.141			-0.717
			(0.48)			(-1.13)
Mutualratio*ROA			1.701***			0.588
			(2.99)			(0.60)
QFIIratio*ROA			-0.951			-1.920
			(-0.19)			(-0.20)
ROA	0.782***	0.907***	0.987***	1.000***	1.161***	1.267***
	(4.61)	(5.90)	(6.57)	(3.73)	(4.87)	(5.37)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,062	9,062	9,062	2,697	2,697	2,697
R-squared	0.327	0.329	0.328	0.397	0.396	0.395

This table shows the effects of institutional investors across regions using the firm fixed-effect model. Columns (1) to (3) are results using firms from more developed regions as the sample and columns (4) to (6) are results using firms from less developed regions as the sample. The slightly lower number of observations is due to missing information about some firms' locations. Dependent variable is the natural logarithm of CEO compensation. Control variables in equation (2.1) are included in each regression. Definitions of all the variable are the same as those in Table 2.1. Year dummies are included. The t-statistics (in parentheses) are computed using robust standard errors clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

2.5.4 Robustness tests

In this section, a further analysis is conducted to check the robustness of the main results. First, two alternative measures of CEO compensation are considered: the first measure is CEO compensation including CEO ownership values; and the second

Table 2.10 Effects of institutional ownership on the CEO pay-performance relationship using alternative definition of CEO pay

Dependent variable	The natural log of (CEO pay + value of CEO's shareholding)			The natural log of average compensation of the top three executives		
	(1)	(2)	(3)	(4)	(5)	(6)
Mutuald	0.004			0.028**		
	(0.16)			(2.34)		
QFIId	0.013			0.003		
	(0.41)			(0.14)		
Mutuald*ROA	1.129***			0.398**		
	(3.52)			(2.10)		
QFIId*ROA	-0.648			-0.099		
	(-1.40)			(-0.37)		
Mutual		0.789**			0.478**	
		(2.16)			(2.18)	
QFII		-0.163			0.849	
		(-0.07)			(0.72)	
Mutual*ROA		8.978**			5.813**	
		(2.05)			(2.06)	
QFII*ROA		-36.944			4.896	
		(-1.11)			(0.29)	
Mutualratio			0.175**			0.068
			(2.09)			(1.26)
QFIIratio			-0.007			0.130
			(-0.01)			(0.48)
Mutualratio*ROA			1.635*			1.206**
			(1.66)			(2.10)
QFIIratio*ROA			-10.319			1.814
			(-1.35)			(0.40)
ROA	1.035***	1.306***	1.379***	1.038***	1.064***	1.114***
	(4.82)	(6.58)	(7.12)	(6.93)	(8.18)	(8.73)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,028	13,028	13,028	13,028	13,028	13,028
R-squared	0.174	0.176	0.175	0.508	0.510	0.509

This table shows the results using different measurement of CEO pay. Specifically, columns (1) to (3) use the natural logarithm of (CEO pay + value of CEO's shareholding) to measure CEO compensation. Columns (4) to (6) use the natural log of average compensation of the top three executives to measure CEO pay. Control variables in equation (2.1) are included in each regression. Definitions of all the variables are the same as those in Table 2.1. Year dummies are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

measure is the average compensation of the top three executives. It has been shown in previous literature that managerial ownership can be used to incentivize managers to deliver good performance (Harford and Li, 2007), and thus its relationship with firm performance should also be positive due to the monitoring by institutional investors. In this section, to test this conjecture, it is examined whether CEO pay, including the value of their shareholding, is positively related to firm performance with the presence of institutional investors. Following the method used by Bergstresser and Philippon (2006), the value of shares held by the CEO is calculated as the total number of common shares held by CEOs at the end of the fiscal year, multiplying the closing prices of the common shares at the end of the fiscal year. The results are reported in Table 2.10. The results of the key variables are quantitatively similar to those reported in Table 2.3 which confirm the robustness of the main results.

Second, this section considers an alternative measure of firm performance which is market-based. This is mainly because institutional investors are expected to maximize the return of their investment portfolios via appreciations in stock price so they might have incentives to link CEO pay to market-based performance. To provide empirical evidence for this conjecture, two proxies for firm market performance are employed: annual stock returns (RET) and Tobin's Q, and then equation (2.1) is re-estimated. Table 2.11 reports the results. It is observed in Table 2.11 that both domestic mutual funds and QFIIs have no significant effects on linking CEO pay to firm market performance. This suggests that in China, institutional investors are more concerned about the accounting performance of investee firms than market performance. One possible explanation could be that since the Chinese stock market is influenced by many factors such as government manipulation, stock returns are too noisy to measure firm

Table 2.11 Effects of the institutional ownership on the CEO pay-performance relationship using stock return and Tobin's Q as the proxy for firm performance

Dependent variable: the natural log of CEO pay						
	RET			Tobin's Q		
	(1)	(2)	(3)	(4)	(5)	(6)
Mutuald	0.038***			0.007		
	(3.88)			(0.35)		
QFIId	-0.006			-0.013		
	(-0.42)			(-0.37)		
Mutuald*Perfmarket	0.010			0.021*		
	(0.88)			(1.89)		
QFIId* Perfmarket	0.012			0.006		
	(0.61)			(0.35)		
Mutual		0.841***			0.808***	
		(5.77)			(2.95)	
QFII		0.226			1.355	
		(0.28)			(0.80)	
Mutual* Perfmarket		0.063			0.047	
		(0.53)			(0.36)	
QFII* Perfmarket		0.337			-0.634	
		(0.28)			(-0.65)	
Mutualratio			0.162***			0.167**
			(4.50)			(2.46)
QFIIratio			0.035			0.515
			(0.21)			(1.30)
Mutualratio* Perfmarket			0.008			0.002
			(0.30)			(0.08)
QFIIratio* Perfmarket			-0.020			-0.314
			(-0.05)			(-1.26)
Perfmarket	0.052***	0.048***	0.054***	0.013	0.021*	0.025**
	(3.94)	(4.14)	(4.66)	(1.05)	(1.90)	(2.42)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,028	13,028	13,028	13,028	13,028	13,028
R-squared	0.332	0.334	0.333	0.331	0.333	0.332

This table shows the results of testing the effects of institutional investors using firm fixed-effect model. Dependent variable is the natural log of CEO compensation. *Perfmarket* is firm market performance, which is proxied with *RET* (annual stock return) and Tobin's Q. Columns (1) to (3) are results of using *RET* as a proxy for firm market performance. Columns (4) to (6) are results of using Tobin's Q as a proxy for firm market performance. Control variables in equation (2.1) are included in each regression. Definitions of all the variable are the same as those in Table 2.1. Year dummies are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

performance accurately. For example, China's Gross Domestic Product (GDP) was $1,211 billion in 2000 and $12,237 billion in 2017, which means that it increased by 14.57% each year. Meanwhile, the Shanghai Stock Exchange index was 1408 in 2000

and 3196 in 2017, representing an increase of 4.9% per year. Obviously, market performance cannot reflect accounting performance. Therefore, the accounting measures are most likely to reflect firm performance and applied by investors to assess firm value.

Table 2.12 Regression results with one-year lagged institutional investors' ownership

Dependent variable: the natural log of CEO pay			
	(1)	(2)	(3)
$Mutuald_{t-1}$	0.029**		
	(2.55)		
$QFIId_{t-1}$	0.024		
	(1.14)		
$Mutuald_{t-1}*ROA_{t-1}$	0.456**		
	(2.44)		
$QFIId_{t-1}*ROA_{t-1}$	-0.104		
	(-0.43)		
$Mutual_{t-1}$		0.756***	
		(4.85)	
$QFII_{t-1}$		0.901	
		(0.81)	
$Mutual_{t-1}*ROA_{t-1}$		2.988*	
		(1.68)	
$QFII_{t-1}*ROA_{t-1}$		0.901	
		(0.81)	
$Mutualratio_{t-1}$			0.227***
			(5.21)
$QFIIratio_{t-1}$			0.702*
			(1.70)
$Mutualratio_{t-1}*ROA_{t-1}$			1.136**
			(2.40)
$QFIIratio_{t-1}*ROA_{t-1}$			-0.308
			(-0.05)
ROA_{t-1}	1.065***	1.427***	2.599***
	(7.06)	(16.75)	(25.53)
Control	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Observations	13,028	13,028	13,028
R-squared	0.285	0.293	0.304

This table shows the results of testing one-year lagged institutional ownership. Definitions of all the variables are the same as those in Table 2.1. Year dummies are included. The t-statistics (in parentheses) are computed using robust standard errors clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Moreover, to further test the robustness between institutional ownership and CEO pay-performance relationship, re-estimates equation (2.1) is re-estimated by using one-year lagged institutional ownership and control variables. Table 2.12 presents the results. It is shown that all the coefficients of one-year lagged mutual funds' ownership measurements and firm performance are positive and significant, while all the coefficients of QFIIs' ownership measurements and firm performance are insignificant. These results indicate that mutual funds' ownership in the last year can yield to a stronger positive relationship between CEO pay and firm performance in the current year, while the ownership of QFIIs have no such effects. The results further validate the causality issue between mutual funds' ownership and CEO pay-performance relationship.

2.6 Conclusion

Using a sample of China's listed firms from 2005 to 2015, this chapter examines the effects of institutional investors on the relationship between CEO pay and firm performance. The empirical results indicate that domestic mutual funds play an important monitoring role in linking CEO pay to firm performance. Moreover, this monitoring effect is stronger when mutual fund ownership is larger and closer to controlling shareholder's ownership. However, QFIIs do not have such an effect on the CEO pay-performance relationship. These results are robust to alternative estimation methods in addressing endogeneity issues and using alternative measures for the key variables.

Moreover, the effects of domestic mutual funds are more pronounced in non-SOEs and local government controlled SOEs than in central government controlled SOEs. This chapter also provides strong evidence that mutual funds affect CEO pay-

performance by improving corporate governance. In particular, the positive effect of mutual funds is more significant in those firms with weaker industry tournament. Meanwhile, the monitoring role of domestic mutual funds is stronger in firms from more developed regions due to better investor protection and less information asymmetry.

Overall, institutional investors reveal heterogeneous influences on monitoring firm management in China, which advances the understanding of the importance to identify the types of institutional investors when investigating their influence. The results show that in China with many dialects and a relationship-based economy, foreign investors face severe information asymmetry problems and are less efficient in monitoring, suggesting that further regulatory efforts are required to protect foreign investors' rights and reinforce their function in improving corporate governance in China. As a more important implication, this chapter suggests that considering the influence of controlling shareholders can shed more light on understanding the effect of involving institutional investors in corporate governance practices in China.

Chapter 3 Institutional investors, contestability and firm innovation

3.1 Introduction

This chapter provides insights into the effects of institutional investors on firm innovation performance. Firm innovation is crucial for firm development and contribution to economic growth. However, innovation involves a long-term investment with a high probability of failure, hence it is important to understand the determinants of firm innovation. Since institutional investors continue to evolve and play an increasingly important role in corporate governance, a number of studies have investigated the effect that institutional investors have on firm innovation activity, whilst presenting different views. Some studies contend that institutional investors increase short-termism because they are mainly concerned with short-term performance and thus undermine innovative effort. Whereas other studies argue that institutional investors tend to encourage/force managers to innovate by reducing their myopic behaviour or protecting them from the reputational consequences of innovation failure. As a result, institutional investors have positive effects on firm innovation (Kochhar and David, 1996; Aghion et al., 2013; Bena et al., 2017; Luong et al., 2017; Rong et al., 2017).

However, these studies on the impact of institutional investors on firm innovation are mainly focused on the level of institutional ownership (Aghion et al., 2013; Rong et al., 2017), while ignoring the influence of the controlling shareholders on institutional investors' monitoring behaviours which is of greater significance especially in emerging markets. On the one hand, in emerging markets, the concentration of ownership is a common phenomenon and the controlling shareholders usually make the ultimate

decisions on firm policies (La Porta et al., 1998; Jiang and Kim, 2015). It is therefore possible that institutional investors are captured by the controlling shareholders, which compromises their independence and leads to their monitoring role less straightforward. On the other hand, the institutional environment is underdeveloped and investor protection is weaker in emerging markets, so it is difficult for non-controlling shareholders to have a voice in investee firms (Claessens and Fan, 2002). Thus, whether the expected functions of institutional investors can be ensured or whether the interest of institutional investors can be effectively preserved is unclear, because these concerns directly shape the incentives and behaviours of institutional investors. Moreover, it is important for firms to access funds when there is a need to invest in new technology. However, financial markets are underdeveloped in emerging economies, and this hampers a firm's ability to access external finance for innovation investment (Fan et al., 2011; Jiang et al., 2017). Thus, it is meaningful to investigate the effects of institutional ownership on firm innovation in emerging markets by considering the influence of the controlling shareholders.

This chapter provides insights into these issues and answers the question: What is the effect of institutional investors on firm innovation, particularly with the presence of controlling shareholders in the emerging market of China? This investigation is motivated by recent studies that attempted to examine the effects of institutional investors on firm innovation (Aghion et al., 2013; Bena et al., 2017; Luong et al., 2017). By using US listed firms as a sample, Aghion et al. (2013) document that domestic institutional investors in the US can enhance firm innovation. As a complement to this study, Bena et al. (2017) and Luong et al. (2017) provide further evidence that foreign institutional investors, especially those from developed countries, have a positive effect on innovations of non-US firms. By putting them together, it is clear that institutional

investors from developed countries can effectively boost firm innovation. The study in this chapter complements theirs by considering the controlling shareholders' influence and showing the different roles that domestic and foreign institutional investors play in affecting firm innovation in China.

This investigation is also motivated by existing studies on the influence of multiple large shareholders. Some studies argue that when there are multiple large shareholders in a firm, they have incentives to compete for the controlling position by uniting other minority shareholders and serve a monitoring role (Pagano and Röell, 1998; Bennedsen and Wolfenzon, 2000; Maury and Pajuste, 2005; Attig et al., 2008; Laeven and Levine, 2008). Other studies show that large shareholders, other than the controlling shareholders, may find it valuable to collude with the controlling shareholders to extract benefits by trading on private information rather than exercising effective monitoring (Kahn and Winton, 1998). In the spirit of these studies, institutional investors' effects are relevant to whether they are one of the large shareholders in a firm. With the presence of controlling shareholders, the effects of institutional investors may be subject to their ability to challenge the controlling shareholders, i.e., their contestability of the controlling shareholders. However, any examination in this regard is rarely to be found in the literature. Thus, this chapter will fill the void to provide insights into the effects of institutional investors on firm innovation in terms of their contestability that is represented by their ownership difference with that of controlling shareholders.

It is important to obtain a much deeper understanding about the effects of institutional investors on firm innovation in the Chinese context. First, China's economy is growing faster and has become the second largest economy in the world after the US, which plays a crucial role in the world economy. One important engine driving this

sustainable growth is the improvement in innovation capacity. China has aimed to become an innovative country since 2006, which was emphasized at the 18th National Congress meeting in 2012. Innovation has therefore become the theme of economic development and is the driving force behind China's transformation, which has contributed to the recovery and growth of the world economy, especially after the global financial crisis.

Second, China is still an emerging market with an institutional environment that differs from developed markets, such as underdeveloped financial market, government intervention, concentrated ownership, and weaker investor protection. The theory established based on developed markets may not be able to directly explain the behaviours of institutional investors in China. Therefore, it is essential to understand the roles that institutional investors play in promoting firm innovation, particularly facing with the presence of the controlling shareholders. The findings drawn from this research will help to provide some implications for other emerging markets.

Third, over recent decades, various types of institutional investors have emerged and are growing rapidly, such as domestic mutual funds, Qualified Foreign Institutional Investors (QFIIs), brokers, banks, social security funds and others. They are expected to have different effects on corporate policies and governance (Liu et al., 2014), and thereby firm innovation. The investment incentives of various types of institutional investors provide sufficient tension to examine/compare their influences on firm innovation. Moreover, ownership concentration is a prevalent feature in Chinese listed firms, and governments and families are usually the controlling shareholders. This existence of ownership concentration also enables this chapter to investigate whether

the influence of institutional investors is subject to the incentive that controlling shareholders have for innovation.

Furthermore, China's unique culture (such as a relationship-based economy, different accounting standards and uncommon languages) aggravates the information asymmetry faced by foreign institutional investors (Chakravarty et al., 1998). In this situation, whether or not foreign institutional investors can have the same influence as domestic institutional investors becomes unclear, so whether or not foreign institutional investors can still enhance firm innovation effectively, as expected, is still worth investigating.

This chapter draws several notable findings. First, domestic mutual funds' contestability can significantly enhance firm innovation, while QFIIs do not have such an effect, after controlling for the ownership level of institutional investors. These results are robust after correction for endogeneity issues using the Heckman two-stage model, propensity score matching (PSM) method and the change regressions. These results are also robust when using several different proxies for firm innovation. Second, the positive effects of contestability by domestic mutual funds on firm innovation becomes stronger in firms where the controlling shareholder is a non-government entity, facing more competitive market, with non-politically connected CEOs, and with less analyst coverage. These results show strong support that the effects of institutional ownership on firm innovation become stronger when they are able to compete with the controlling shareholders and monitor CEOs, which are consistent with the career concern view.

This chapter contributes to existing literature in several ways. First, it enriches the research on the effects that institutional investors have on firm innovation. Existing

studies either focus on domestic institutional investors in the developed market (Aghion et al., 2013) or foreign institutional investors in an international context (Bena et al., 2017; Luong et al., 2017), whereas this chapter focuses on domestic and foreign institutional investors in the largest emerging market of China and directly compares their influence on firm innovation by considering some unique institutional factors in emerging markets.

Second, this chapter also relates to Rong et al. (2017). Although they examined a similar issue in China, they mainly focused on the level of ownership held by these institutional investors, whereas this chapter carries out further analysis by differentiating between domestic and foreign institutional investors, and more importantly looking at their contestability of the controlling shareholders by examining the difference between the ownership of institutional investors and the controlling shareholders. In this way, this chapter provides new insights into the relationship between institutional investors and firm innovation by considering the influence of the controlling shareholders in China where ownership is usually concentrated.

Third, this chapter adds to the literature about the effect that foreign institutional investors have on firm innovation in emerging markets. Previous studies find that foreign institutional investors can stimulate firm innovation by providing new knowledge/technology and reducing managerial career risk (Bena et al., 2017; Luong et al., 2017). However, this chapter provides empirical evidence from a new perspective by considering the Chinese institutional context. This chapter finds that in the presence of the controlling shareholders, QFIIs are more likely to be captured by the controlling shareholders so that their influence on firm innovation does not increase significantly when their ownership is close to the controlling shareholders, which is probably due to

that foreign institutional investors are less informed about the culture of investee countries so it would be difficult for them to compete with the controlling shareholders.

Fourth, Bena et al. (2017) and Luong et al. (2017) use a cross-country analysis to examine the effect that foreign institutional investors have on firm innovation. A cross-country analysis intends to generate rules that are able to apply in a number of countries. However, it could also raise some concerns due to the large variation of institutional environments across countries such as the legal systems, taxation regimes, political economies, and security laws. The observed variations of institutional ownership and firm innovation relationship could be the result of these institutional factors at the country level. For example, foreign institutional investors who invest in different countries are subject to different accounting standards and regulations. Thus, the rules generated from a cross-country analysis may be short of applicability in a single emerging market. With this in mind, this chapter applies a single country analysis by focusing on the Chinese economy, which can overcome some of the criticisms of cross-country studies, while holding constant the institutional factors that may be correlated with institutional ownership and firm innovation.

Finally, this chapter contributes to existing literature with regards to the effects of multiple large shareholders (MLS). Previous studies note that the presence of MLS indicates an efficient monitoring effects in curbing the expropriation achieved by forming a coalition with other large stakes or competing for control by attracting minority shareholders (Attig et al., 2009; Bennedsen and Wolfenzon, 2000; Lehmann and Weigand, 2000; Mishra, 2011). However, this chapter finds some useful evidence to show that the monitoring function of MLS depends on the identity of the large shareholders and the controlling shareholders, because domestic and foreign

institutional investors have different effects on firm innovation when they face pressure from the controlling shareholders.

The rest of this chapter is organised as follows: Section 3.2 introduces background information and develops hypotheses. Section 3.3 describes the sample and variables used in the empirical model. Section 3.4 presents the empirical results and addresses endogeneity issues. Section 3.5 makes some additional analysis and reports results of testing potential channel and section 3.6 draws some conclusions.

3.2 Background and hypotheses

3.2.1 Firm innovation in China

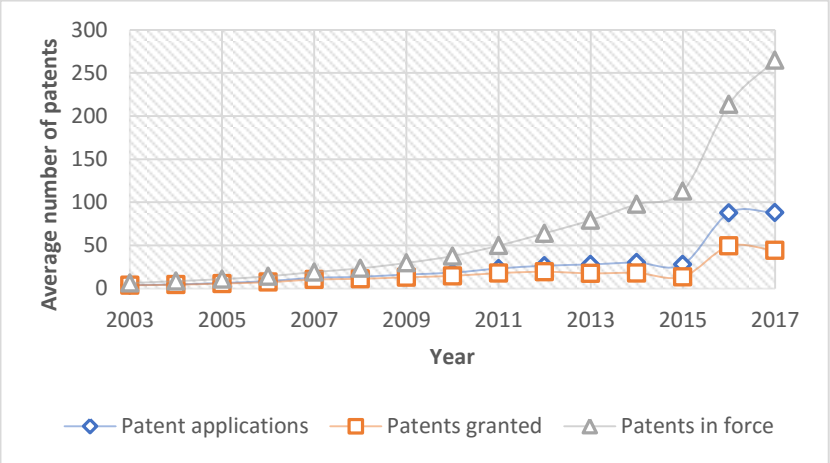
Firm innovation is of great importance for long-term economic growth in a country. The Chinese economy has developed rapidly since the economic reform in the late 1970s and is now the second largest economy in the world. Firm innovation contributes a lot to China's rapid economic development. The Chinese government has enacted a series of laws and regulations to stimulate firm innovation activities. In October 2007, *China's Property Law* was inaugurated to protect the rights of property owners. In China, there are three types of patents including invention patents, utility patents, and design patents. Invention patents are to protect the new technical solution for a product, a process or an improvement. Utility patents are granted to protect the new and practical solutions related to a product's shape or structure. Design patents are granted to protect the shape patterns, or the combinations of colour and shape, or patterns that are aesthetically pleasing and industrially applicable. The statistics of firm patents shows that the capacity of Chinese firm innovation has improved significantly over the past decades. For instance, from 1985 to 2011, the accumulative number of patent applications from China and foreign countries was 8,665,828, of which 2,849,906

(32.89%) were invention patents, whereas the annual patent applications in 2015 were 2,798,500, of which 1,101,864 (39.37%) were invention patents. The number of annual patent applications further increased to 3,697,845 in 2017 and invention patents were 1,381,594 (37.36%) [15].

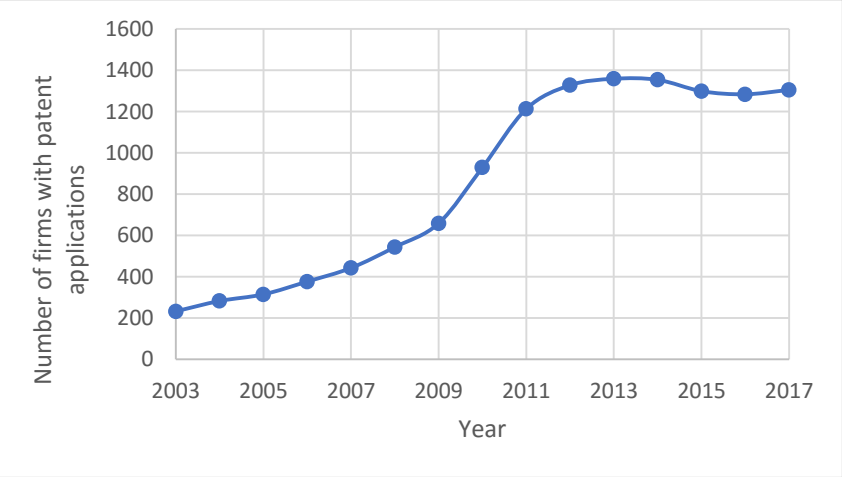
Figure 3.1 Firm innovation among sample firms

This figure illustrates the trend of firm innovation among sample firms. Panel A shows the average number of patent applications, patents granted and patents in force in each year. Panel B shows the number of firms which have non-zero patent applications each year.

A. The average number of patent applications, patents granted and patents in force



B. Number of firms with non-zero patent applications



[15] Please see detailed summary of the number of patents application, granted and in force each year from the patent statistics yearbooks which are published by State Intellectual Property Official of the People's Republic of China. Please see the following link: http://www.sipo.gov.cn/tjxx/gjzscqjtjnb/index.htm.

Figure 3.1 shows the innovation output by the sample firms in each year between 2003 and 2017. Panel A shows the average number of patent applications, patents granted and patents in force across the sample period. Panel B shows the number of firms which have non-zero patent applications across the sample period. In Panel A, it shows that the total number of patent applications, patents granted and patents in force by all sample firms have been increasing steadily since 2003, especially after 2015, the increase trend became more significant. This indicates a significant increase of input and output of innovation activities in China. In Panel B, it is also found that the number of firms that have patent applications increases during the sample period, indicating that more and more firms in China have put efforts and emphasis on innovation.

3.2.2 Institutional investors and firm innovation

It has been documented that institutional investors have a positive influence on firm innovation (Aghion et al., 2013; Bena et al., 2017; Luong et al., 2017; Rong et al., 2017). On the one hand, innovation is long-term investment with complicated procedure and requires a high level of professional knowledge and management skills. Thus, CEOs may avoid updating knowledge and hardworking (quiet life view, Bertrand and Mullainathan, 2003), and hence they are reluctant to take action in firm innovation. On the other hand, innovation is risky investment that has high possibility of failure. CEOs' career concerns may also reduce their incentives to innovate, as they are afraid of being sacked due to the early-stage failure of innovation (career concern view, Manso, 2011; Ederer and Manso, 2013). The existence of institutional investors could resolve these issues. It is acknowledged that institutional investors are sophisticated with professional knowledge and are able to collect and process firm information, which can effectively reduce the information asymmetry, improve corporate governance and exert efficient

monitoring over managers' behaviours (Gillan and Starks, 2000; Hartzell and Starks, 2003; Khan et al., 2005; Ferreira and Matos, 2008; Boone and White, 2015; Doidge et al., 2015). By gathering more proprietary firm information, institutional investors are also likely to identify the stochastic reasons of innovation failure, thus are able to insulate CEOs from punishment due to innovation failure and motivate them to innovate (Aghion et al., 2013; Luong et al., 2017). Additionally, compared with individual investors, institutional investors usually hold diversified portfolios, so they are more tolerant of innovation failure and tend to encourage investment in innovative projects.

However, these existing studies almost exclusively focus on the level of institutional ownership and ignore the influence from other shareholders, such as the controlling shareholders when ownership is concentrated. It has been well documented that ownership concentration is a common feature of Chinese listed firms, and a large proportion of shares are held by the controlling shareholders who usually dominate firm policies (Jiang and Kim, 2015). Institutional investors in China are usually non-controlling shareholders, thus their positive effects on firm innovation might be determined by their contestability of the controlling shareholders.

The contestability of the controlling shareholders by non-controlling shareholders and their influence on firm value and policy have been examined by an established literature of multiple large shareholders (MLS). This literature contends that non-controlling shareholders are still powerful and influential in firm policy making via competing for control by forming coalitions with other large shareholders. Thus, the existence of MLS indicates control contestability and plays a governance/monitoring role in a firm (Pagano and Röell, 1998; Bennedsen and Wolfenzon, 2000; Attig et al., 2008; Laeven and Levine, 2008; Attig et al., 2009; Mishra, 2011; Jiang et al., 2018).

According to this strand of literature, it is proposed that institutional investors, who usually hold a relatively large ownership compared with other individual investors in China, have powerful contestability and are likely to compete with the controlling shareholders, which facilitate their influence on firm innovation policy more effectively. However, this contestability effect is heterogeneous across institutional investor types.

It is proposed that domestic mutual funds are able to exert strong contestability to enhance firm innovation. This conjecture is mainly motivated by existing findings that domestic mutual funds are active monitors and have significant influence on firm policies (Chen et al., 2007; Yuan et al., 2008; Firth et al., 2016). In the spirit of Dvořák (2005) and Bae et al. (2008), it could be argued that in China, domestic mutual funds are better informed about investee firms and have the information advantage, because they are familiar with the Chinese accounting standards, local language/dialects, and local regulations (Chakravarty et al., 1998). Moreover, domestic mutual funds are independent from the local governments and have no conflicts of interest with the investee firms. Therefore, domestic mutual funds are more likely to exert their influence on promoting firm innovation via competing with the controlling shareholders.

However, QFIIs face more challenges and disadvantages when making investments in listed firms in China which may constrain their abilities and incentives in exerting their influence on firm innovation policy. First, as described in Section 1.2.1, foreign institutional investors face strict regulations and restrictions on their investment in listed firms due to the institutional setting. Therefore, QFII ownership in listed firms is lower and QFIIs are less likely to compete for control as they can obtain very little benefits from the high cost monitoring (Jiang and Kim, 2015). Second, QFIIs are owned by foreigners, who may have a different culture, language and the legal system of their own

countries from those in China (Liu et al., 2014), which create severe information asymmetry between QFIIs and their investee firms, and thus make it more difficult and costly for QFIIs to clean firm information. Third, Chinese economy is imbedded with severe government intervention and relationship is regarded as a key factor to the business success. Due to the institutional differences and short-term investment history, QFIIs would find it difficult to build good relationships with the governments, and therefore difficultly and costly to contend with the controlling shareholders. Moreover, QFIIs are able to move their capital from China to another market when they anticipate a high risk, which further discourage them to engage in high cost monitoring. Therefore, it is expected that QFIIs in China have weaker incentives to form contestability to have influential effect on firm innovation policy.

Overall, based on the above discussions, the following hypothesis is set as follows:

H: Domestic mutual funds have strong contestability of the controlling shareholders to enhance firm innovation, while such an effect does not exist for QFIIs.

3.3 Data and methodology

3.3.1 Data and sample selection

The initial sample consists of all the A-share firms listed on the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE) from 2003 to 2017. The reason for sample period starting from 2003 is that the ownership of institutional investors in firms' annual reports was not reported until 2003. The sample excludes firms flagged with ST and *ST[16], firms with missing observations, and firms from the financial industry because their financial reports need special requirements which may

[16] ST stands for Special Treatment and refers to the listed firms that have had negative net profits for two consecutive years. *ST refers to the listed firms that have has negative net profits for three consecutive years and thus are probably to be delisted from the stock exchanges.

bias the results. The sample finally consists of 2,534 firms and 25,404 firm-year observations. All the data are extracted from the Chinese Stock Market and Accounting Research (CSMAR) database, which is the data source for a large body of published research (e.g., Fan et al., 2007; Firth et al., 2016; Zhang et al., 2016).

3.3.2 Firm innovation measurement

To be consistent with a large body of existing research (e.g., Aghion et al., 2013; Hsu et al., 2015; Luong et al., 2017), the patent number is used as an indicator of firm innovation. The patent data are obtained from the "Listed Firms' Patents" dataset in CSMAR. This dataset provides the total number of patent applications by each firm in each year, as well as the number of patents granted in the following four years (for those patent applications in year *t*, the number of patents granted in year *t+1* to year *t+4*). It also provides the total number of patents in force by the end of each year for each firm. Using this information, this chapter constructs three proxies for firm innovation from three perspectives: (1) The number of patent applications in each year, which measures the quantity of innovative activities. (2) The number of patents that are eventually granted (those applied in the application year), which measures the quality of these innovative activities. (3) The number of patents in force in each year, which measures a firm's stock of innovative activities. In the regression analyses, this chapter transforms these measures into the natural logarithm of one plus the number of patent applications, one plus the number of patents eventually granted, and one plus the number of patents in force, respectively. In addition to these three proxies, this chapter also uses ratio of number of patents granted to the number of patent applications as an alternative proxy for firm innovation performance.

3.3.3 Institutional investors contestability measurements

To measure the institutional investors' contestability of the controlling shareholders, the method in the existing studies of MLS are employed in this chapter (Laeven and Levine, 2008; Attig et al., 2009; Jiang et al., 2018). The first measure is the ratio of institutional investors' ownership to the controlling shareholders' ownership and two continuous variables are constructed: the first variable is *Mutualratio*, defined as the ratio of ownership held by domestic mutual funds to the controlling shareholder's ownership; the second variable is *QFIIratio*, defined as ratio of the ownership held by QFIIs to the controlling shareholder's ownership. The higher values of these two ratios indicate the higher relative power of the institutional investors in relation to the controlling shareholders.

The second measure of contestability by institutional investors is the ownership dispersion and two variables are created: the first one is *Mutualdisp*, defined as the difference of ownerships between the controlling shareholders and domestic mutual funds divided by the sum of their ownerships; the second one is *QFIIdisp*, defined as the difference of ownerships between the controlling shareholders and QFIIs divided by the sum of their ownerships. The higher this ratio, the lower is the contestability of the control by institutional investors.

It is noted that there are some firms having more than one institutional investor with at least 1% of ownership. To calculate the above-mentioned variables, the institutional investor with the largest ownership are chosen, following the literature of multiple large shareholders (Laeven and Levine, 2008). It is also possible that institutional investors could form a coalition and act as a block, as indicated in the study of Firth et al. (2016),

so the aggregate ownership of the institutional investors is also used to calculate the above-mentioned variables and repeats the analysis.

3.3.4 Model

To examine the effects of institutional investors' contestability on firm innovation empirically, the following linear model is established:

$$Patent_{i,t+1}=\beta_0+\beta_1 Mutualcontest_{i,t}+\beta_2 QFIIcontest_{i,t}+\beta_3 Mutual_{i,t}+\beta_4 QFII_{i,t}+\beta_5 Asset_{i,t}+\beta_6 Board_{i,t}+\beta_7 Indep_{i,t}+\beta_8 Otherins_{i,t}+\beta_9 Leverage_{i,t}+\beta_{10} ROA_{i,t}+\beta_{11} Tangibility_{i,t}+\beta_{12} CEOgender_{i,t}+\beta_{13} CEOage_{i,t}+Dummy(year)+Dummy(industry)+\varepsilon_{i,t} \quad (3.1)$$

where *Patent* represents firm innovation, which are proxied by the variables discussed in section 3.3.2 in the regressions. Considering the causal effect that factors have on firm innovation, this chapter uses one-year leading firm patent numbers as the dependent variable in the empirical estimation. The employment of one-year leading dependent variable could also avoid the endogenous issue to some extent due to the interactive correlation between institutional ownership and firm innovation. *Mutualcontest* and *QFIIcontest* represent the contestability by domestic mutual funds and QFIIs, respectively. Empirically, this chapter runs two regressions separately. The first regression uses *Mutualratio* and *QFIIratio* to replace *Mutualcontest* and *QFIIcontest*, respectively. According to the hypothesis (H), β_1 is expected to be significantly positive and β_2 is expected to be insignificant. The second regression uses *Mutualdisp* and *QFIIdisp* to replace *Mutualcontest* and *QFIIcontest*, respectively. According to the hypothesis (H), β_1 is expected to be significantly negative and β_2 is expected to be insignificant. To mitigate the concern that these contestability proxies

may just capture the level of institutional investors' ownership or the controlling shareholders' ownership, the ownership levels of domestic mutual funds (*Mutual*) and QFIIs (*QFII*) are also included for control in the regressions.

Table 3.1 Definitions of variables

Variables	Definitions
Panel A: Firm innovation	
Patent applications	The natural logarithm of one plus the number of patents applied
Patents granted	The natural logarithm of one plus the number of patents granted
Patents in force	The natural logarithm of one plus the number of patents in force
Panel B: Institutional ownership	
Mutual	The percentage of shares owned by domestic mutual funds in a firm.
QFII	The percentage of shares owned by QFIIs in a firm
Mutualratio	The ratio of mutual funds' ownership to the controlling shareholder's ownership
QFIIratio	The ratio of QFIIs' ownership to the controlling shareholder's ownership
Mutualdisp	(The controlling shareholder's ownership-mutual funds' ownership) / (The controlling shareholder's ownership + mutual funds' ownership)
QFIIdisp	(The controlling shareholder's ownership-QFIIs' ownership) / (The controlling shareholder's ownership + QFIIs' ownership)
Panel C: Other variables	
SOE	A dummy variable which is equal to 1 if the firm is ultimately controlled by the government and 0 otherwise
Otherins	The percentage of shares owned by other institutional investors (banks, insurance companies, social security funds, brokers, entrust companies, and financial companies) in a firm.
Asset	The natural logarithm of total assets
Board size (Board)	The natural logarithm of the number of directors on the board
Independent directors (Indep)	Proportion of independent directors on the board
Leverage	Total debts/total assets in book value
ROA	Net income/total assets
Tangibility	The ratio of firm fixed assets to total assets
CEOgender	The gender of CEOs, which equals to 1 if the CEO is male, and 0 if female
CEOage	The age of CEOs
PC	A dummy variable equal to 1 if the Chairman or CEO of the firm is politically connected and 0 otherwise. Politically connected is defined as if the Chairman or CEO was a former or is a current official of the government, a member of the National People's Congress (NPC) or a member of the Chinese People's Political Consultative Conference (CPPCC).
Analyst	The natural logarithm of one plus the number of analysts tracking the firm each year.
HHI	Herfindahl–Hirschman Index, defined as the sum of the squared market share of each firm within the industry

To consider the effects of other factors on firm innovation, this chapter includes a set of control variables by following existing studies (Fang et al., 2014; Bena et al., 2017; Luong et al., 2017; Rong et al., 2017). Definitions of the control variables are listed in Table 3.1. Specifically, *Asset* represents is the natural logarithm of firm total assets. *Board* is the natural logarithm of the number of directors on the board and *Indep* is the percentage of independent directors. *Otherins* denotes the sum of ownership held by all the other institutional investors (such as banks, insurance companies, pension funds, brokers, entrust companies, social securities and financial companies). *Leverage* is the ratio of total debt to total assets. *ROA* is return on assets, defined as the ratio of net income to firm total assets. *Tangibility* is asset tangibility, measured as the value of firm asset liquidation scaled by the total book assets, following Almeida and Campello (2007). *CEOgender* is the gender of CEO of each firm in each year, which equals to 1 if the CEO is male and 0 if female. *CEOage* is the age of CEO of each firm in each year. Year dummies and industry dummies variables are included to control for year and industry fixed effects.

3.4 Empirical Results

3.4.1 Summary statistics

Table 3.2 reports the summary statistics of variables used in the empirical analyses. Panel A shows the summary of patent information for both the full sample and subsample with non-zero values of patent or institutional ownership. For those observations with non-zero values of patent, the average number of patent applications, patents eventually granted and total patents in force are 54.41, 36.63 and 128.70, respectively. For firms which have domestic mutual funds or QFIIs as shareholders, the average number of patents applications, patents granted and total patents in force are

35.81, 23.12 and 92.27, respectively. These average patent numbers are higher than 27.65, 17.42 and 74.04 of the full sample, indicating that patents are increased when there are institutional investors in a firm.

Panel B shows the summary of institutional ownership for full sample and sample of firms that have institutional ownership. Among firms having domestic mutual funds as shareholders, the average ownership held by domestic mutual funds is 3.81% with the highest level being 43.80%. Among firms having QFIIs as shareholders, the average QFIIs' ownership is 1.26% with the highest level being 15.08%. These statistical numbers are quite similar to Firth et al. (2016) and Jiang et al. (2017), and facilitate the examination of their various influences given large variations of the ownership difference. The average ratio of domestic mutual funds' ownership to the controlling shareholder's ownership, and the average ratio of QFIIs' ownership to the controlling shareholder's ownership are 13.22% and 4.20%, respectively. The mean values of *Mutualdisp* and *QFIIdisp* are 79.95% and 92.46%, respectively. These results indicate high concentration of ownership in Chinese firms and the need to explore the influence of institutional ownership by considering the effect of controlling shareholders. Panel C lists the control variables used in the empirical analysis. The average board size is 8.95, with 3.23 (36.09%) serving as independent directors. The average ownership of the controlling shareholder is 36.17%, suggesting high ownership concentration. Panel D shows the distribution of the sample firms, of which there are 11,139 firm-year observations of state-owned enterprises (SOEs) and 14,265 for non-state-owned enterprises (non-SOEs). The percentage of firms with managerial political connection in SOEs and non-SOEs are 23.33% and 34.49%, respectively.

Table 3.2 Summary statistics

Variable	Obs.	Mean	Std.Dev.	25%	Median	75%	Max
Panel A: Firm innovation							
A.1: Full sample							
Patent applications	25,404	27.65	253.70	0	1	13	20,107
Patents granted	25,404	17.42	135.00	0	0	9	11,844
Patents in force	25,404	74.04	559.50	0	4	39	43,619
A.2: Observations with non-zero values of patent applications/patents granted/patents in force							
Patents applied	12,911	54.41	353.84	5	12	32	20,107
Patents granted	12,081	36.63	194.97	4	10	24	11,844
Patents in force	14,615	128.70	732.90	10	30	85	43,619
A.3: Observations with non-zero values of mutual funds or QFIIs' ownership							
Patents applied	15,291	35.81	301.53	0	2	17	20,107
Patents granted	15,291	23.12	168.68	0	1	12	11,844
Patents in force	15,291	92.27	656.20	0	8	50	43.619
Panel B: Institutional ownership							
B.1: Full sample							
Mutual (%)	25,404	2.23	3.68	0	0.45	2.93	43.80
QFII (%)	25,404	0.11	0.54	0	0	0	15.08
Mutualratio (%)	25,404	7.73	15.49	0	1.21	8.77	330.20
QFIIratio (%)	25,404	0.35	2.09	0	0	0	73.08
Mutualdisp (%)	25,404	88.28	19.95	83.87	97.62	1	1
QFIIdisp (%)	25,404	99.36	3.37	1	1	1	1
Otherins (%)	25,404	3.47	8.44	0	0.88	3.12	85.64
B.2: Observations with non-zero values of mutual funds/QFIIs' ownership							
Mutual (%)	14,855	3.81	4.14	0.81	2.30	5.42	43.80
QFII (%)	2,142	1.26	1.41	0.41	0.82	1.60	15.08
Mutualratio (%)	14,855	13.22	18.38	2.25	6.68	16.66	330.20
QFIIratio (%)	2,142	4.20	5.98	1.02	2.31	4.95	73.08
Mutualdisp (%)	14,855	79.95	21.15	71.45	87.48	95.61	99.99
QFIIdisp (%)	2,142	92.46	9.10	90.56	95.49	97.99	99.98
Panel C: Other firm characteristics							
Assets (Million)	25,404	9,500	52,800	1,150	2,400	5,490	2,410,000
Leverage (%)	25,404	45.44	21.99	28.52	45.43	61.44	108.61
ROA (%)	25,404	3.57	6.03	1.28	3.51	6.36	19.69
Tangibility (%)	25,404	24.58	17.63	10.75	21.18	35.15	74.96
Board Size	25,404	8.95	1.86	8	9	9	19
Independent directors	25,404	3.23	0.66	3	3	3	8
Controlling (%)	25,404	36.17	15.50	23.97	33.88	47.28	89.99
CEOgender	25,404	0.94	0.23	1	1	1	1
CEOage	25,404	47.79	6.40	43	48	52	64

Panel D: Firm distributions according to ownership and political connections

	SOEs (11,139)		Non-SOEs (14,265)	
	Political connected	Non-political connected	Political connected	Non-political connected
Observations	2,599	8,540	4,920	9,345
(Percentage)	(23.33%)	(76.67%)	(34.49%)	(65.51%)

This table reports the summary statistics of all the variables for the full sample from 2003 to 2017. Panel A is summary statistics for patent data. Panel B reports the summary statistics for institutional ownership. Panel C is summary statistics for variables representing firm characteristics and corporate governance. Panel D is summary for firm distributions between state-owned-enterprises (SOEs) and non-state-owned-enterprises (non-SOEs), and between firms with and without political connections. All the definitions of these variables are listed in Table 3.1. The value of variables is in terms of China's currency, the RMB.

3.4.2 Effects of institutional investors contestability on firm innovation

This section reports the empirical results of estimating equation (3.1) to test the main hypothesis. The results are shown in Table 3.3 using the patent applications as the dependent variable. Note that columns (1) to (3) are the results using the ratio of institutional ownership to the controlling shareholder's ownership as contestability measures and columns (4) to (6) are the results using the dispersion proxies. Specifically, column (1) and column (2) report the results on domestic mutual funds and QFIIs separately, and the ratio variables are of the main interests. It is shown that the coefficient of *Mutualratio* is positive and statistically significant at 1% level (coefficient is 0.314 and t-value is 2.82), while the coefficient of *QFIIratio* is insignificant. These results indicate that when domestic mutual funds hold a relative closer ownership to the controlling shareholder, they are more able to exert their influence on improving firm innovation, while QFIIs' incentive to promote firm innovation does not show such an incremental pattern when their ownership is closer to that of the controlling shareholder. To make further comparison between domestic mutual funds and QFIIs, column (3) reports the results by putting mutual funds' ownership and QFIIs' ownership together in one regression model. The results of variables that is more concerned are consistent with those separately reported in column (1) and column (2).

Moreover, the regressions are repeated by replacing ownership ratios with ownership dispersion, *Mutualdisp* and *QFIIdisp*, to test the contestability by domestic mutual funds and QFIIs. The results are reported in columns (4) to (6). Specifically, column (4) and column (5) report the results on domestic mutual funds and QFIIs

Table 3.3 The effects of institutional investors on patent applications

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variables			Patent applications			
Mutualratio	0.314***		0.279***			
	(2.82)		(4.50)			
QFIIratio		1.640	1.180			
		(1.52)	(1.06)			
Mutualdisp				-0.354***		-0.324***
				(-3.55)		(-5.81)
QFIIdisp					-0.842	-0.283
					(-1.15)	(-0.38)
Mutual	0.085***		0.083***	0.054*		0.053**
	(2.74)		(3.90)	(1.67)		(2.38)
QFII		0.082*	0.090**		0.091*	0.112**
		(1.93)	(2.08)		(1.95)	(2.37)
Asset	0.244***	0.253***	0.240***	0.246***	0.252***	0.242***
	(9.07)	(25.11)	(22.51)	(9.14)	(25.09)	(22.67)
Indep	0.190	0.193	0.191	0.193	0.192	0.193
	(0.52)	(1.02)	(1.00)	(0.53)	(1.01)	(1.02)
Board	0.060	0.063	0.058	0.059	0.063	0.058
	(0.46)	(1.09)	(1.01)	(0.46)	(1.09)	(1.00)
Otherins	0.001	0.001	0.001	0.001	0.001	0.001
	(0.36)	(0.76)	(0.61)	(0.34)	(0.74)	(0.55)
Leverage	-0.587***	-0.606***	-0.590***	-0.593***	-0.606***	-0.595***
	(-5.61)	(-12.48)	(-12.06)	(-5.67)	(-12.47)	(-12.15)
ROA	1.436***	1.622***	1.374***	1.391***	1.618***	1.329***
	(5.39)	(10.01)	(8.36)	(5.24)	(9.99)	(8.08)
Tangibility	-0.794***	-0.798***	-0.796***	-0.791***	-0.800***	-0.795***
	(-5.74)	(-13.74)	(-13.72)	(-5.72)	(-13.76)	(-13.70)
CEOGender	0.101	0.113***	0.107***	0.100	0.112***	0.107***
	(1.27)	(3.01)	(2.87)	(1.27)	(3.00)	(2.85)
CEOAge	-0.005*	-0.005***	-0.005***	-0.005*	-0.005***	-0.005***
	(-1.67)	(-3.56)	(-3.48)	(-1.66)	(-3.55)	(-3.44)
Constant	-4.893***	-5.029***	-4.794***	-4.573***	-4.184***	-4.219***
	(-7.99)	(-20.49)	(-18.94)	(-7.35)	(-5.42)	(-5.41)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,705	22,705	22,705	22,705	22,705	22,705
R-squared	0.368	0.368	0.370	0.368	0.368	0.370

This table presents the effects of institutional ownership on firm innovation. Dependent variable is the natural logarithm of one-year leading patent application plus one. Specifically, column (1) to (3) presents the results of testing the ratio of institutional ownership to the controlling shareholders' ownership on firm innovation. Column (4) to (6) presents the results of testing the dispersion proxies. *Mutualratio* represents the ratio of domestic mutual funds' ownership to the controlling shareholder's ownership. *QFIIratio* represents the ratio of QFIIs' ownership to the controlling shareholder's ownership. *Mutualdisp* represents dispersion proxy for domestic mutual funds' contestability, defined as the difference in the controlling ownership and domestic mutual funds' ownership over their sum. *QFIIdisp* represents dispersion proxy for QFIIs' contestability, defined as the difference in the controlling ownership and QFIIs' ownership over their sum. *Mutual* is domestic mutual funds' ownership. *QFII* refers to QFIIs' ownership. All the other variables' definitions are the same as in Table 3.1. Year dummies and industry dummies are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

separately. It is observed that the coefficient of *Mutualdsip* is negative and statistically significant at 1% level (coefficient is -0.354, t-value is -3.55), indicating that closer ownership between domestic mutual funds and controlling shareholder (higher contestability by domestic mutual funds) enables domestic mutual funds to exert further efforts to increase firm innovation. By contrast, the coefficients of *QFIIdisp* are insignificant, suggesting that the contestability by QFIIs does not have such a significant effect. To make comparison between domestic mutual funds and QFIIs, column (6) reports the results of putting domestic mutual funds' ownership and QFIIs' ownership in one regression model. Again, the negative and significant coefficient of *Mutualdisp* still holds, while the coefficient is insignificant for QFIIs.

The overall results in Table 3.3 are supportive to the main hypothesis that domestic mutual funds are sophisticated investors and are able to contest with the controlling shareholders and discipline managers to promote firm innovation when they hold closer ownership to that of controlling shareholders. By contrast, foreign institutional investors usually have a different culture from China where the economy is relationship-based and there exist various dialects. Therefore, QFIIs have no significant contestability effects. Furthermore, in each regression, the ownership levels of domestic mutual funds and QFIIs are also included as control variables. The results show that the ownership of both domestic mutual funds and QFIIs has a positive effect on firm innovation, which is consistent with Rong et al. (2017) using the Chinese setting. The results for other control variables are consistent with previous studies (Kochhar and David, 1996; Tian and Wang, 2014). Overall, these results show that the effects of institutional investors are subject to their identities as well as their contestability of the controlling shareholders.

The results in Table 3.3 are about the effect of institutional investors' contestability on the quantity of innovative activities, namely the patent applications by each firm in each year. This section further examines the effect of institutional investors' contestability on the quality of innovative activities (measured by the number of patents granted) and the stock of innovation (measured by the number of patents in force). Empirically, equation (3.1) is re-estimated by replacing the dependent variables with the natural logarithm of one plus one-year leading number of patents granted, and the natural logarithm of one plus one-year leading number of patents in force. The results are reported in the first four columns in Table 3.4. Specifically, column (1) and column (2) report the results of using patents granted as the dependent variable, and column (3) and column (4) report the results of using patents in force as the dependent variable. These results show that the estimated coefficients of the key variables are in line with those reported in Table 3.3, suggesting that the contestability by domestic mutual funds also affects the quality and quantity of firm innovation. Their effects are subject to not only their identities and their ownership level, but also their ownership difference from the controlling shareholder's ownership.

In addition to the prior examination using patents granted as a quality measurement, the ratio of patents granted to patent applications is further employed as another proxy for patent quality. The results are reported in column (5) and column (6) in Table 3.4. Moreover, a Poisson count number model is also conducted by using the raw patent application number as the dependent variable, and the results are reported in columns (7) and (8) in Table 3.4. Again, the results indicate that regardless of firm innovation measurements, domestic mutual funds are able to promote firm innovation by competing with the controlling shareholders and forming contestability. In contrast,

QFIIs' incentives to compete with the controlling shareholders are much weaker so that their contestability has no significant effects.

Table 3.4 The effects of institutional investors on patents granted and patent in force

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Patents granted		Patents in force		Patents granted/ Patent applications		Raw number of patents applied	
Mutualratio	0.194***		0.283***		0.030*		0.314***	
	(3.27)		(4.08)		(1.77)		(3.60)	
QFIIratio	0.800		1.015		-0.269		-0.768	
	(0.71)		(0.74)		(-1.03)		(-0.87)	
Mutualdisp		-0.244***		-0.345***		-0.034**		-0.354***
		(-4.53)		(-5.46)		(-2.26)		(-4.34)
QFIIdisp		0.070		-0.257		0.128		0.384
		(0.10)		(-0.28)		(0.71)		(0.47)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,705	22,705	22,705	22,705	22,705	22,705	22,705	22,705
R-squared	0.314	0.314	0.466	0.467	0.230	0.242		

This table presents the results using alternative measurements of firm innovation. Specifically, column (1) and column (2) use the natural logarithm of one plus one-year leading number of patents granted as the dependent variable. Column (3) and column (4) use the natural logarithm of one plus one-year leading number of patents in force as the dependent variable. Column (5) and column (6) use the ratio of patents granted to patents applied as the dependent variable. Column (7) and column (8) use the original number of patent applications as the dependent variables and the results are obtained using Poisson count number model. Control variables in equation (3.1) are included in each regression. All the variables' definitions are the same as in Table 3.1. Year dummies and industry dummies are included. The t-statistics are reported in parentheses in column (1) to (6). The z-statistics are reported in parentheses in column (7) and column (8). The z-statistics and t-statistics are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

3.4.3 Endogeneity concern

In the previous models, one-year leading dependent variable is used to avoid potential reverse causality. However, there is still one endogeneity concern that institutional investors may select firms based on their predicted innovation performance, and thus the results using OLS model could be biased. Although endogeneity is less

likely to be ruled out completely, this section tries to establish the causality and mitigate this concern to a large extent by using Heckman two-stage method, propensity score matching (PSM) method and change regressions.

First, the Heckman (1979) two-stage procedure is applied to correct for the potential endogeneity issue of selection bias because institutional investors might invest in particular firms. Since it is argued above that domestic investors and foreign investors have different incentives that affect firm innovation, their preferences for investee firms differ (Liu et al., 2014). Therefore, instrumental variables for domestic mutual funds and QFIIs should be different to run the first stage of the Heckman method. Following Firth et al. (2016) and Rong et al. (2017), an index-inclusion dummy variable (*Indexdom*) is constructed as the instrumental variable for domestic mutual funds. This dummy variable equals to 1 if the firm is included in either the Shanghai 180 Index or the Shenzhen Component Index[17], and 0 otherwise. This instrumental variable is employed because domestic mutual funds might tend to mimic market indexes, and are thus more likely to invest in firms that are included in the market indexes. However, the firm innovation policy is not an inclusive criterion for these indexes and is therefore not related to index membership. It is expected that the ownership of domestic mutual funds is positively related to the index-inclusion dummy. With regards to QFIIs, this chapter follows Luong et al. (2017) and uses an international index inclusion, the MSCI China A inclusion index[18] as an instrumental variable. A dummy variable (*MSCI*) is constructed, which equals to 1 if a firm is included in the

[17] Shanghai 180 Index is an index of representative 180 stocks that are traded in Shanghai Stock Exchange (SHSE). Shenzhen Component Index inclusions was adjusted from 40 to 500 representative stocks traded in Shenzhen Stock Exchange (SZSE) in May of 2015. The inclusion of these two indexes depends on a firm's market capitalization, stock trading liquidity and market position in its industry sector.

[18] MSCI China A inclusion index measures large and mid-cap representation across China securities listed on the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE). This index is designed for international investors and to track the progressive partial inclusion of A shares in the MSCI Emerging Markets Index over time.

MSCI China A inclusion index, and 0 otherwise. The first stage of Heckman two-stage procedure includes two OLS estimations where both domestic and foreign institutional investor ownership measurements are regressed on their respective instrumental variables and the same control variables from equation (3.1). This also meets the exclusion restrictions of conducting Heckman two-stage method, as these two instrumental variables are not included in the second-stage regressions. From the first stage, the inverse mills ratios (Lambda) are obtained and they are included as independent variables in the second stage regression of firm innovation. Columns (1) and (2) of Table 3.5 report the first-stage results, which show that the estimated coefficients of *Indexdom* and *MSCI* are both positive and statistically significant. These results indicate that the instrumental variables are efficient and valid. The results from the second stage are reported in columns (3) and (4). It is found that both coefficients of $Lambda_{Mutual}$ and $Lambda_{QFII}$ are significant, which indicates that the selection bias and an endogeneity issue might exist in the previous analysis. After addressing the selection bias issue, the results of the concerned variables are still consistent with those reported in Table 3.3.

Moreover, the documented relationship between institutional ownership and firm innovation could be driven by some unobserved firm characteristics or jointly determined. To address this issue, a matching sample using PSM method is constructed. In this matching process, for each firm-year observation in the treatment sample (i.e., those observations with either domestic mutual funds or QFIIs as shareholders), an observation in the control sample (i.e., those observations with neither domestic mutual funds nor QFIIs as shareholder) can be identified with the same/nearest propensity score of firm characteristic including firm size, board size, independent board proportion, other institutional ownership, leverage, ROA, tangibility, CEO gender and CEO age. In

this way, it can be ensured that treatment firms and control firms are similar and only differ in institutional investor ownership. Then, equation (3.1) is re-estimated using this matched sample and the results are reported in columns (5) and (6) of Table 3.5. The matching sample has 20,688 observations. Since the independent variable is a one-year leading value, the number of observations used in each regression reduces to 18,355. Again, it is found that the coefficients of the key variables are broadly consistent with those in Table 3.3.

The endogeneity issue is further addressed in this section by examining the change of the relative ownership by institutional investors to the controlling shareholders on patent applications. Empirically, four variables are constructed to denote the change of the relative institutional ownership: (1) *ΔMutualratio,* which is the change of the ratio of domestic mutual funds' ownership to the controlling shareholders' ownership; (2) *ΔQFIIratio,* which is the change of the ratio of QFIIs' ownership to the controlling shareholders' ownership; (3) *ΔMutualdisp*, which is the change of ownership dispersion for domestic mutual funds; (4) *ΔQFIIdisp*, which is the change of ownership dispersion for QFIIs. Equation (3.1) is then re-estimated by using *ΔMutualratio* and *ΔQFIIratio*, *ΔMutualdisp* and *ΔQFIIdisp* in the model. The results are presented in columns (7) and (8) of Table 3.5. It is observed that the coefficient of *ΔMutualratio* is significantly positive and the coefficient of *ΔMutualdisp* is significantly negative, which indicates that the increase of the relative ownership of domestic mutual funds to the controlling shareholders can further improve firm innovation. The insignificant results of *ΔQFIIratio* and *ΔQFIIdisp* are also consistent with the previous arguments. The results further support the main hypothesis.

Table 3.5 Results of addressing potential endogenous issues

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First stage of Heckman		Second stage of Heckman		PSM method		Change of institutional ownership	
Dependent variable	Domestic investor measures	Foreign investor measures	Patent applications		Patent applications		Patent applications	
Indexdom	0.740***							
	(2.69)							
MSCI		0.097***						
		(6.91)						
Mutualratio			0.281***		0.282***			
			(4.54)		(4.52)			
QFIIratio			1.492		1.131			
			(1.61)		(1.03)			
Mutualdisp				-0.327***		-0.285***		
				(-5.90)		(-4.96)		
QFIIdisp				-0.452		-0.238		
				(-0.62)		(-0.36)		
ΔMutualratio							0.089**	
							(2.08)	
ΔQFIIratio							-0.546	
							(-1.63)	
ΔMutualdisp								-0.073**
								(-1.97)
ΔQFIIdisp								0.289
								(1.60)
$Lambda_{Mutual}$			0.533***	0.535***				
			(12.35)	(10.70)				
$Lambda_{QFII}$			-4.474***	-4.424***				
			(-6.79)	(-5.68)				
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	25,404	25,404	22,705	22,705	18,355	18,355	22,702	22,702
R-squared	0.117	0.033	0.376	0.377	0.364	0.360	0.362	0.366

This table presents the results of addressing endogenous issues using Heckman two-stage method, PSM method and considering the change of institutional ownership. *Indexdom* is a dummy variable equals to 1 if the firm is included in either the Shanghai 180 Index or the Shenzhen Component Index, and 0 otherwise. *MSCI* is a dummy variable which equals to 1 if a firm is included in MSCI China A inclusion index, and 0 otherwise. *ΔMutualratio* represents the change of the ratio of mutual funds' ownership to the controlling shareholders' ownership. *ΔQFIIratio* represents the change of the ratio of QFIIs' ownership to the controlling shareholders' ownership. *ΔMutualdisp* represents the change of ownership dispersion for domestic mutual funds. *ΔQFIIdisp* represents the change of ownership dispersion for QFIIs. $Lambda_{Mutual}$ and $Lambda_{QFII}$ are inverse mills ratios obtained from the first stage of Heckman two-stage model. All the other variables' definitions are the same as in Table 3.1. Year dummies and industry dummies are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

3.5 Additional analysis and potential channel

3.5.1 The effects of institutional investors: SOEs vs non-SOEs

The main argument is that institutional investors affect firm innovation via monitoring managers and this influence is increasing with the increasing of their contestability of the controlling shareholders. In China, there are two major types of firms controlled by two distinct types of controlling shareholders. One type is state-owned enterprises (SOEs) controlled by the governments, and the other type is non-SOEs controlled by non-government entities such as families, individuals and private institutions. In the sample, almost half of the firms (43.85%) are SOEs, and the remaining are non-SOEs.

It is proposed that the effects of contestability by institutional investors on firm innovation are weaker in SOEs than that in non-SOEs for the following reasons: First, under the current Chinese political system, the appointment of CEOs in SOEs is under direct control of the government, and the selection of CEOs is usually decided by administrative authorities (Fan et al., 2013; Cao et al., 2019). Candidates are from a pool of SOE managers or government officials (Rong et al., 2017). In this sense in SOEs, CEOs' career concerns are closely related to the government assessments and how well they can implement the government policies to satisfy the multiple objectives. Thus, CEOs in SOEs are more likely to make decisions following government instructions rather than maximising shareholder value, and as a result, institutional investors could exert limited influence on CEOs' behaviours. Second, SOEs are usually used by the governments to intervene in the market and satisfy political objectives, such as maintaining social stability, keeping employment rate and paying taxes (Pan et al., 2019). So their business activities are largely dependent on and determined by the

governments, and less likely to be influenced by the other shareholders such as institutional investors. Moreover, domestic mutual funds are faced with political pressure and regulations from local governments in SOEs (Firth et al., 2010; Huang and Zhu, 2015), so their incentives to contend with the controlling shareholder (the government) would be weaker. Therefore, this chapter expects that the influence of contestability by domestic mutual funds would be less significant in SOEs. Empirically, this chapter tests the heterogeneity of the controlling shareholders' identities by dividing the sample firms into SOEs and non-SOEs. The following model is also established for estimation:

$$\begin{aligned} Patent_{i,t+1} = {} & \beta_0 + \beta_1 Mutualcontest_{i,t} + \beta_2 QFIIcontest_{i,t} + \beta_3 Mutualcontest_{i,t} * SOE_{i,t} \\ & + \beta_4 QFIIcontest_{i,t} * SOE_{i,t} + \beta_5 SOE_{i,t} + \beta_6 Mutual_{i,t} + \beta_7 QFII_{i,t} \\ & + \beta_8 Asset_{i,t} + \beta_9 Board_{i,t} + \beta_{10} Indep_{i,t} + \beta_{11} Otherins_{i,t} + \beta_{12} Leverage_{i,t} \\ & + \beta_{13} ROA_{i,t} + \beta_{14} Tangibility_{i,t} + \beta_{15} CEOgender_{i,t} + \beta_{16} CEOage_{i,t} \\ & + Dummy(year) + Dummy(industry) + \varepsilon_{i,t} \end{aligned} \quad (3.2)$$

where *SOE* is a dummy variable which is equal to 1 if a firm is an SOE and 0 if a firm is a non-SOE. The interactive terms between *SOE* dummy and contestability measures are included to test the effects of state-controlling shareholders. All the other variables are defined the same as those in equation (3.1).

The results of estimating equation (3.2) are reported in Table 3.6 where the coefficients of the interactive terms are the main concerns. Columns (1) to (3) report the results of contestability using the ratio proxies, and columns (4) to (6) report the results of contestability using the dispersion proxies. Consistent with the structure of the results in Table 3.3, equation (3.2) is estimated by entering contestability proxies separately

first and then combing them together. As shown in Table 3.6, the coefficients of *Mutualratio*SOE* are significantly negative (t-value is -1.97 in column (1) and -2.09 in column (3)), and the coefficients of *Mutualdisp*SOE* are significantly positive (t-value is 2.59 in column (4) and 2.57 in column (6)). These results are consistent with the expectation, indicating that the incentives of domestic mutual funds to compete with the controlling shareholders become weaker in SOEs than in non-SOEs. These results are also supportive to the main hypothesis that institutional investors affect firm innovation via forming contestability to monitor CEOs' behaviours.

Table 3.6 The effects of institutional investors on firm innovation: SOEs vs non-SOEs

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable				Patent applications		
Mutualratio	0.387***		0.357***			
	(4.75)		(4.37)			
QFIIratio		1.988	1.878			
		(1.12)	(1.48)			
Mutualdisp				-0.433***		-0.404***
				(-6.30)		(-5.85)
QFIIdisp					-1.261	-0.838
					(-1.10)	(-1.07)
Mutualratio*SOE	-0.212**		-0.228**			
	(-1.97)		(-2.09)			
QFIIratio*SOE		-1.661	-1.038			
		(-0.98)	(-0.98)			
Mutualdisp*SOE				0.238***		0.240**
				(2.59)		(2.57)
QFIIdisp*SOE					1.365	0.972
					(1.27)	(1.50)
SOE	-0.150***	-0.204***	-0.149***	-0.374***	-1.566	-1.346**
	(-7.09)	(-4.04)	(-7.02)	(-4.40)	(-1.46)	(-2.11)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,705	22,705	22,705	22,705	22,705	22,705
R-squared	0.370	0.359	0.372	0.370	0.359	0.372

This table presents the effects of state ownership on institutional investors' effects. Dependent variable is the natural logarithm of one-year leading patent application plus one. *SOE* is a dummy variable which equals to 1 if the firm is ultimately controlled by the government and 0 otherwise. All the other variables' definitions are the same as in Table 3.1. Year dummies and industry dummies are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

3.5.2 Career concern view vs. quiet life view

The previous results show that domestic mutual funds' contestability can promote firm innovation, which is consistent with the idea that domestic mutual funds can alleviate the CEOs' concerns of being fired due to early-stage failure of innovation (career concern view, Ederer and Manso, 2013) or exert monitoring over managerial behaviours to motivate CEOs to innovate (quiet life view, Bertrand and Mullainathan, 2003). In particular, according to the career concern view, since innovative activities usually involve a large probability of failure, the managers expose themselves to a high risk of being fired for innovation-related reasons. The managers concern their career stability as the first priority, thus they do not like to invest in innovative activities. Institutional investors can mitigate managers' career concerns better as they may help to identify stochastic reasons of innovation failure and insulate the failure from the managers' responsibility. According to the quiet life view, managers prefer a quiet life rather than undertaking an innovation action that may negatively impact their careers. Institutional investors can monitor the managers not to be "lazy" for enjoying a quiet life. This section conducts a further analysis to differentiate between career concern view and quiet life view, and then provides direct evidence to show which view dominates in the Chinese setting and can better explain the effects of domestic mutual funds contestability on firm innovation.

Following the empirical design by Aghion et al. (2013), product market competition is employed to test these two views. The empirical model includes the interaction between institutional investors' contestability and product market competition. The basic idea is that managers are already disciplined to avoid the threat of takeover or bankruptcy when product market competition is intense, thus have more

incentives to innovate. In particular, consistent with the career concern view, the influence of institutional investors' contestability on firm innovation should be stronger in firms facing higher level of competition, while consistent with the quiet life view, the influence of institutional investor contestability on firm innovation should be stronger in firms facing lower level of competition.

Table 3.7 The effects of institutional investors based on product market competition

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:			Patent applications			
Mutualratio	0.455***		0.415***			
	(6.21)		(3.15)			
QFIIratio		1.126	1.268			
		(0.66)	(0.68)			
Mutualdisp				-0.493***		-0.461***
				(-7.82)		(-4.09)
QFIIdisp					-0.722	-0.342
					(-0.60)	(-0.27)
Mutualratio*HHI	-3.046***		-2.894**			
	(-4.38)		(-2.36)			
QFIIratio*HHI		-9.863	-9.209			
		(-0.79)	(-0.69)			
Mutualdisp*HHI				3.118***		3.046***
				(5.78)		(3.23)
QFIIdisp*HHI					5.184	3.505
					(0.71)	(0.44)
HHI	0.285	-0.143	0.294	-2.713***	-5.329	-6.143
	(1.43)	(-0.48)	(0.93)	(-5.10)	(-0.73)	(-0.77)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,705	22,705	22,705	22,705	22,705	22,705
R-squared	0.368	0.356	0.370	0.369	0.356	0.371

This table presents the effects of product market competition on institutional investors' effects. Dependent variable is the natural logarithm of one-year leading patent application plus one. *HHI* is Herfindahl index. All the other variables' definitions are the same as in Table 3.1. Year dummies and industry dummies are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Product market competition is measured by Herfindahl–Hirschman Index (*HHI*), which is defined as the sum of the squared market share of each firm within the industry. So a higher value of *HHI* indicates a lower level of product market competition.

Empirically, this chapter re-estimates equation (3.2) by replacing *SOE* with *HHI*. The estimation results are reported in Table 3.7. Consistent with the structure of Table 3.6, columns (1) to (3) report the results of contestability using ratio proxies and columns (4) to (6) report the results of contestability using dispersion proxies. It is shown that the coefficients of *Mutualratio*HHI* are significantly negative in both column (1) and column (3), and the coefficients of *Mutualdisp*HHI* are significantly positive in both column (4) and column (6). These results suggest that the effects of domestic mutual funds are even stronger in firms facing higher level of product market competition. These results indicate that market competition and institutional investor contestability are complementary in affecting firm innovation, and therefore are consistent with the career concern view.

By exploiting the Chinese setting, another set of analysis is able to be conducted to examine that the quiet life view does not explain the role of institutional investors in China. Bertrand and Mullainathan (2003) posit that in the quiet life model, institutional investors are able to reduce the managerial entrenchment by monitoring managers. Thus, in this section, it is examined whether the effects of domestic mutual funds' contestability on firm innovation could be more significant when CEOs are more entrenched and less concerned about their careers. In particular, CEOs' political connections are employed as a measurement for CEO entrenchment. There is a large number of studies showing that political connections can provide unique resources to the operation of the firms (e.g., Faccio, 2006; Claessens et al., 2008), which makes managers more entrenched in their positions and thus less concerned about their careers (Cao et al., 2017). In this sense, politically connected CEOs might have less incentive to conduct innovative activities to enhance firm performance, and thus are able to enjoy a quiet life. Following these studies, the CEOs' political connection is identified if the

CEO was a former or is a current: (1) government official, (2) a member of the standing committee of the National People's Congress (NPC), and/or (3) a member of the Chinese People's Political Consultative Conference (CPPCC). The information of each CEO background is obtained from the Corporate Governance dataset in the CSMAR database. This dataset provides detailed working experience of each executive for each firm, so their politically related working experience can be manually collected to identify their political connections. Empirically, a dummy variable is constructed: *PC*, which equals to 1 if the CEO is politically connected and 0 otherwise, and equation (3.2) is re-estimated by replacing *SOE* with *PC*.

The estimation results are reported in Table 3.8, and the coefficients of the interactive terms are the main concerns. It is observed that the coefficients of *Mutualratio*PC* are significantly negative in column (1) and column (3), and the coefficients of *Mutualdisp*PC* are significantly positive in column (4) and column (6). These results suggest that the effects of domestic mutual funds' contestability on firm innovation are less significant when CEOs are politically connected, indicating that institutional investors are unable to monitor politically connected CEOs (who are entrenched) or force them to innovate. These results provide some additional evidence that quiet life view cannot explain the mechanism that how institutional investors affect firm innovation in China.

Overall, the empirical results show that the effects of domestic mutual funds' contestability on firm innovation are stronger in firms facing intense product market competition, and also less significant in firms where managers are more entrenched and are less concerned about their careers. These results suggest that career concern view is applied to explain the effects of institutional investors on firm innovation.

Table 3.8 The effects of political connection

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: The natural logarithm of one-year leading patent application plus one						
Mutualratio	0.442***		0.370**			
	(3.01)		(2.44)			
QFIIratio		1.545	1.827			
		(0.74)	(0.82)			
Mutualdisp				-0.472***		-0.410***
				(-3.66)		(-3.07)
QFIIdisp					-0.804	-0.807
					(-0.58)	(-0.58)
Mutualratio*PC	-0.311**		-0.263*			
	(-2.17)		(-1.75)			
QFIIratio*PC		-0.480	-0.575			
		(-0.28)	(-0.32)			
Mutualdisp*PC				0.277**		0.237*
				(2.24)		(1.81)
QFIIdisp*PC					0.319	0.349
					(0.33)	(0.31)
PC	0.337***	0.521***	0.343***	0.068	0.224	-0.237
	(9.82)	(16.33)	(10.02)	(0.58)	(0.24)	(-0.22)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,705	22,705	22,705	22,705	22,705	22,705
R-squared	0.311	0.266	0.313	0.311	0.255	0.313

This table presents the effects political connection on institutional investors' effects. Dependent variable is the natural logarithm of one-year leading patent application plus one. *PC* is a dummy variable if there is political connection in a firm and 0 otherwise. All the other variables' definitions are the same as in Table 3.1. Year dummies and industry dummies are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

3.5.3 Corporate governance channel

In the hypothesis development, it is noted that institutional investors can utilise the firm proprietary information to improve the corporate governance which facilitates their monitoring over the managerial behaviours. Then, this section aims to provide empirical evidence to test this argument. It has been shown that analysts are both processers and producers of information (Healy and Palepu, 2001), so institutional investors are likely to demand for analyst service (Boone and White, 2015) to increase the availability of

firm information to further lower the information asymmetry and make more efficient monitoring. In this sense, analysts can improve corporate governance.

Then, to test whether institutional investors' contestability can enhance firm innovation via improving corporate governance, the analyst coverage is used to measure the level of corporate governance. The analyst information is obtained from the Analyst Forecast dataset in CSMAR. If corporate governance is a channel, it is expected that the effects of domestic mutual funds' contestability on firm innovation would be weaker in firms with more analyst coverage. Empirically, a new variable is created, *Analyst*, calculated as the natural logarithm of one plus the raw value of analyst coverage. Equation (3.2) is re-estimated by replacing *SOE* with *Analyst*.

The estimation results are reported in Table 3.9. The interactive terms are the main concern. It is obtained that the coefficients of *Matualratio*Analyst* in columns (1) and (3) are negative and significant at 5% level, and the coefficients of *Mutualcontest*Analyst* in columns (4) and (6) are positive and significant at 1% level. These results indicate that the positive effects of domestic mutual funds' competition with the controlling shareholders are weaker in firms with more analyst coverage. These results suggest that the positive effects of domestic mutual funds are more significant in firms where corporate governance is weaker. The results support the argument that as important monitors, institutional investors could efficiently improve corporate governance level, and managers thereby are better monitored to invest more on innovative projects.

Table 3.9 Results of testing corporate governance channel

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: The natural logarithm of one-year leading patent application plus one						
Mutualratio	0.581***		0.550***			
	(2.82)		(2.68)			
QFIIratio		3.442	3.220			
		(1.41)	(1.26)			
Mutualdisp				-0.635***		-0.608***
				(-3.94)		(-3.77)
QFIIdisp					-2.041	-1.694
					(-1.27)	(-1.03)
Mutualratio*Analyst	-0.156**		-0.156**			
	(-2.38)		(-2.38)			
QFIIratio*Analyst		-0.554	-0.487			
		(-0.85)	(-0.72)			
Mutualdisp*Analyst				0.162***		0.163***
				(2.95)		(2.96)
QFIIdisp*Analyst					0.369	0.303
					(0.86)	(0.68)
Analyst	0.074***	0.075***	0.073***	-0.083*	-0.294	-0.387
	(5.23)	(5.71)	(5.17)	(-1.68)	(-0.69)	(-0.87)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,705	22,705	22,705	22,705	22,705	22,705
R-squared	0.307	0.306	0.316	0.308	0.306	0.308

This table presents the results of testing corporate governance channel. Dependent variable is the natural logarithm of one-year leading patent application plus one. *Analyst* represents analyst coverage each year calculated by the natural logarithm of one plus the number of analysts tracking the firm each year. All the other variables' definitions are the same as in Table 3.1. Year dummies and industry dummies are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

3.6 Conclusion

The Chinese economy has developed rapidly since the late 1970s and the improvement of firm innovation is crucial for economy development. The increasingly important role that institutional investors play in capital markets motivates the investigation of their effect on firm innovation in the emerging market of China. In particular, the co-existence of both significant institutional ownership and controlling shareholders provides an interesting setting to draw meaningful inference about the effectiveness of institutional investors' functions.

This chapter uses patent data as a measure of firm innovation and then compares the effect that domestic mutual funds and QFIIs have on firm innovation. This chapter also uses the ratio of institutional ownership to the controlling shareholders' ownership and their difference to measure institutional investors' contestability of the controlling shareholders. Using a large sample of Chinese listed firms between 2003 and 2017, it is found that domestic mutual funds' contestability can significantly enhance firm innovation, indicating that in the presence of controlling shareholders, domestic mutual funds still can efficiently improve firm innovation by forming contestability and competing with the controlling shareholders. However, the contestability by QFIIs does not have significant effect on firm innovation, because they are faced with strict regulations of their investment in listed firms, unique cultures such as relationship-based and government intervened economy. These strong challenges discourage QFIIs to compete with the controlling shareholders. These results are robust when addressing endogeneity issues using the Heckman two-stage model, PSM method and change regressions. The results are also robust when using several different proxies for firm innovation.

Moreover, the effects of contestability on firm innovation are also subject to the controlling shareholder's identities, and it is found that the effect of domestic mutual funds' contestability is weaker in SOEs than in non-SOEs. Further analysis shows that the effect of institutional investors' contestability on firm innovation is achieved through improving corporate governance and alleviating managerial career concerns which are consistent with the career concerns view. In particular, this chapter finds that the effect of domestic mutual funds' contestability becomes weaker when firms face less competitive market, when CEOs have political connections and firms with more analyst coverage.

Overall, the main results support the view that institutional investors have positive effects on firm innovation, but their effects are subject to the identity of institutional investors as well as their contestability of the controlling shareholders in China. The results of significant influence by the domestic mutual funds indicate the success of the promoting institutional ownership to some extent in China's equity market. However, the insignificant influence by the foreign institutional investors calls for further reform on foreign institutional ownership and release of restrictions over their investment activities in China.

Chapter 4 Institutional investors, controlling shareholders and accounting conservatism

4.1 Introduction

This chapter investigates the influence of institutional investors on accounting conservatism in China. Accounting conservatism is the asymmetrical verification requirement for gains and losses (Basu, 1997). Conservative accounting requires economic losses to be recognized on a timely basis, which can mitigate managers' self-interest behaviours, such as risky investments and overstating financial performance (Watts, 2003a; Ahmed and Duellman, 2007; Ahmed and Duellman, 2011; Lara et al., 2016). It has been reported that shareholders treat accounting conservatism as an effective governance device to mitigate the agency issue with managers (Ball, 2001; Watts, 2003a; Ramalingegowda and Yu, 2012; Lin, 2016). This particularly applies to institutional investors who are deemed to be sophisticated and to have a substantial equity stake (Ramalingegowda and Yu, 2012). However, this evidence is derived from the US setting where the agency problem between managers and shareholders dominates; this inference becomes unclear in emerging markets where the agency problem between majority and minority shareholders is prominent. In emerging markets, ownership is usually concentrated with controlling shareholders, who thus have strong incentives to monitor/discipline managers. Such incentives, to a large extent, can mitigate the interest conflicts between managers and shareholders, leaving the agency problem between controlling shareholders and other investors as the major agency issue (Fan and Wong, 2002). In such emerging markets, controlling shareholders are usually the ultimate decision makers in firm policies. Existing studies have documented that controlling shareholders tend to accept a low level of accounting conservatism than is

expected by minority shareholders. In particular, controlling shareholders would further downgrade their acceptable level of accounting conservatism for their self-interest purposes (Fan and Wong, 2002; LaFond, 2005; Cullinan et al., 2012). It is also documented that accounting conservatism is more beneficial to minority shareholders and creditors in emerging markets, as accounting conservatism provides timely signals of default risk, which will prevent controlling shareholder expropriation and mitigate creditor concerns (Ahmed et al., 2002; Zhang, 2008; Nikolaev, 2010; Haw et al., 2014). Given the exsitence of controlling shareholders in emerging markets, it is thus worthwhile to investigate whether institutional investors, who are usually non-controlling shareholders with a relatively large percentage of shares, still have incentives to require accounting conservatism.

In addition, it has been agreed that institutional investors are sophisticated and professional in collecting and processing information. Thus, institutional investors have the ability to directly discipline managers and influence corporate governance (Hartzell and Starks, 2003; Ming et al., 2018; Gillan and Starks, 2003; Gillan and Starks, 2000; Ingley et al., 2004). Therefore, insitutional investors may be less dependent on financial numbers to exert monitoring on managers and therefore have less demand for accounting conservatism. Furthermore, unlike domestic institutional investors, foreign institutional investors are faced with cultural barriers (Chakravarty et al., 1998; Liu et al., 2014; Luong et al., 2017), which mitigate their direct monitoring effects. Thus, the influence of institutional investors on accounting conservatism becomes more unclear and their demand for accounting conservatism may be subject to their identities.

This chapter aims to provide insights into the effects of institutional investors on firm accounting conservatism in the emerging market of China. This presents a well-

suited laboratory setting for analysis in the following aspects: First, China is the largest emerging market with characteristics that are different from developed markets, such as concentrated ownership, weak law enforcement and weak investor protection. Particularly, the major types of controlling shareholder in China are the government and families that have different economic objectives. Institutional investors are usually non-controlling shareholders, so that their effects are more likely to be influenced by the controlling shareholders. The significant variation of controlling shareholder types enables testing of the influence of institutional investors in the presence of different types of controlling shareholders.

Second, accounting conservatism has been emphasized in China's regulations (*Accounting Standards for Business Enterprises, amended in 2006*). However, it is argued that the adoption of accounting conservatism is subject to the strength of legal enforcement (Ahmed and Duellman, 2011). If the law enforcement is weak, the benefits of conservatism may not hold, which discourages institutional investors' demand for accounting conservatism. The underdeveloped legal system and weak law enforcement in China enables this study to draw inferences of the real effects of institutional ownership on accounting conservatism in emerging markets. Moreover, there are various types of institutional investors in the market, such as domestic mutual funds owned by local private entities, qualified foreign institutional investors (QFIIs) owned by foreigners, and other state-owned institutional investors (such as banks and social security funds). These institutional investors have different investment objectives, so they may have different incentives for the level of conservatism they demand. This setting provides sufficient tension to investigate the effects of different types of institutional investors on firm accounting conservatism.

Empirically, this study uses China's listed firms from 2003 to 2015 as a sample to investigate the different influences of domestic and foreign institutional investors on firm accounting conservatism. Findings are as follows: First, domestic mutual funds' ownership could lower the level of accounting conservatism, while QFIIs' ownership could increase the level of accounting conservatism. Second, the level of accounting conservatism could be further lowered when domestic mutual funds' ownership level is close to that of the controlling shareholders, while further increased when QFIIs' ownership is closer to that of the controlling shareholders. Third, the negative effects of domestic mutual funds on accounting conservatism are weaker in SOEs, firms with lower level of ownership concentration, and firms with less analyst coverage. Furthermore, domestic mutual funds' ownership has negative effects on firms' stock price crash risk. The results are robust using an alternative proxy for accounting conservatism, and after addressing endogeneity issues using the firm fixed effects model, propensity score matching (PSM) method and the Heckman two-stage technique.

This chapter contributes to existing literature in the following ways: First, this chapter is related to the literature about the influence of institutional investors on firm accounting conservatism. Existing studies about the effects of institutional investors on accounting conservatism are mostly focused on developed markets (Ramalingegowda and Yu, 2012; Cheng et al., 2015; Lin, 2016), while this chapter provides insights into an emerging market, China. The results show that domestic mutual funds have negative effects on accounting conservatism in China which is different from the case in the US (Ramalingegowda and Yu, 2012).

Second, this chapter extends studies of the role of institutional investors in the Chinese market. Given the high ownership concentration in China, the incentives for

institutional investors to affect firm policies are influenced by the controlling shareholders' ownership. It is found that the effects of institutional investors on firm accounting conservatism are not only determined by their ownership level, but more importantly determined by the difference in ownership level between them and the controlling shareholders.

More generally, this chapter enriches studies about the effects of equity investors on firm accounting conservatism (Ball, 2001; Watts, 2003a) by looking at an important type of equity investor, institutional investors. It is found that institutional investors' demands for accounting conservatism are subject to their identities. In particular, local investors are able to monitor managers' behaviours directly, so they rely less on financial numbers for monitoring and thus require a lower level of accounting conservatism, while foreign institutional investors require a higher level of accounting conservatism.

The remainder of the paper is organized as follows: Section 4.2 introduces background and develops hypotheses. Section 4.3 describes the sample, model and variables measurement. Section 4.4 presents the empirical results. Section 4.5 presents results of additional analysis and further evidence and section 4.5 draws some conclusions.

4.2 Background and hypotheses

4.2.1 Firm accounting conservatism in China

Accounting conservatism is the asymmetric verification threshold for recognizing good news as gains versus recognizing bad news as losses: the verification threshold for recognizing good news as gains is higher than recognizing bad news as losses (Basu,

1997). Conservatism has been applied to China's firms since July 1985, when the Ministry of Finance of the People's Republic of China enacted *the Accounting Regulations for the Joint Ventures Using Chinese and Foreign Investment*. In the following three decades, accounting regulations have been evolving and the conservatism principle has been playing an important role in China's firms. At the end of 1992, the Ministry of Finance of the People's Republic of China issued *Accounting Standards for Business Enterprises (1992)*, which for the first time explicitly required firms to follow the conservatism principle. Issued in February 2006, *Accounting Standards for Business Enterprises (amended in 2006)* treats conservatism as a tool to reduce information asymmetry, which further emphasizes the importance of the conservatism principle. Currently, the benefits of accounting conservatism have been widely documented in terms of improving firm value by reducing information asymmetry, mitigating agency costs (LaFond and Watts, 2008; Watts, 2003a) and constraining earnings overstatement (Kwon et al., 2001).

4.2.2 Effects of institutional investors on accounting conservatism

Conservative accounting plays a restraining role over self-dealing behaviours of managers such as risky investment and overstatement of earnings (Ball, 2001; Watts, 2003a). Accounting conservatism therefore helps reduce agency problems between managers and shareholders, and this favours the interests of equity holders (Ahmed et al., 2002; Ahmed and Duellman, 2007; Lafond and Roychowdhury, 2008; Lara et al., 2009; Balakrishnan et al., 2016; Francis et al., 2013). Thus, shareholders intentionally require a high level of conservative accounting (Ramalingegowda and Yu, 2012). However, the incentives of institutional investors to demand for accounting conservatism are heterogeneous according to their identities.

Domestic mutual funds have been recognized as sophisticated investors and are well informed about the investee firms. They are able to monitor managers' behaviours directly, by strengthening the managerial pay-performance relationship or through site visits (Gillan and Starks, 2000; Gillan and Starks, 2003; Hartzell and Starks, 2003; Ingley et al., 2004; Jiang and Yuan, 2018; Ming et al., 2018). Therefore, domestic mutual funds may be less dependent on the accounting numbers in conducting monitoring on managers, and thereby have weaker incentives to demand accounting conservatism. Thus, mutual funds' ownership could lower the level of accounting conservatism.

However, unlike domestic mutual funds, QFIIs are geographically far from the investee firms, so it is difficult for them to observe and monitor managers' behaviours directly. More importantly in China, QFIIs are faced with more severe information asymmetry due to cultural barriers such as the relationship-based economy and the existence of various dialects (Chakravarty et al., 1998; Liu et al., 2014; Luong et al., 2017). Consequently, their direct monitoring over managers' behaviours becomes even less straightforward. Therefore, compared with domestic mutual funds, accounting conservatism, as a governance device, is more effective and important for QFIIs, so QFIIs tend to monitor managers via accounting numbers, rather than over managers' behaviours directly. Thus, the first hypothesis is formed as follows:

H1: Domestic mutual funds could lower the level of accounting conservatism, while QFIIs could increase the level of accounting conservatism.

Furthermore, firm ownership in China is usually concentrated and the controlling shareholders usually dominate the decisions on information disclosure. To facilitate their expropriation of other investors, controlling shareholders are reluctant to adopt

conservative accounting to increase the information transparency (Fan and Wong, 2002; Cullinan et al., 2012; LaFond, 2005). In such circumstances, accounting conservatism could be beneficial for diversified minority shareholders as well as outside creditors by providing timely default alerts (Zhang, 2008; Haw et al., 2014; Nikolaev, 2010).

In China, since the institutional investors are usually non-controlling shareholders, this chapter argues that their effect on adoption of accounting conservatism is influenced by the controlling shareholders. This argument is mainly motivated by the existing studies that examine the influence of multiple large shareholders (MLS). These studies find that large non-controlling shareholders can monitor the controlling shareholders' self-interest behaviours by forming control contestability of the controlling shareholders (Bennedsen and Wolfenzon, 2000; Jiang et al., 2018; Laeven and Levine, 2007). In the spirit of these studies, it is proposed that the effects of institutional investors may not only be relevant to their absolute ownership level, but also subject to the relative ownership level, namely the difference between their ownership and that of the controlling shareholders. As domestic mutual funds have less incentive to adopt conservative accounting, it is expected that this effect will be even stronger when their ownership is closer to that of the controlling shareholders. However, unlike domestic mutual funds, QFIIs are likely to require conservative accounting in order to exert monitoring. When the ownership of QFIIs is getting closer to that of controlling shareholders, they are more likely to require a higher level of conservative accounting. Thus, the second hypothesis is formed:

H2: The negative effects of domestic mutual funds and the positive effects of QFIIs on accounting conservatism become stronger when their ownership is closer to that of the controlling shareholders.

4.3 Data and methodology

4.3.1 Data and sample selection

The sample comprises all the A-share firms listed on Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE) from 2003 to 2015. The sample period starts from 2003 because the ownership of institutional investors in firms' annual reports was not reported until 2003. Following the common procedure, the final sample for empirical analysis is obtained after excluding firm-year observations flagged with ST or *ST[19], from financial industry or with missing information. The final sample includes 2,757 firms and 17,890 firm-year observations. All the data are obtained from the Chinese Stock Market and Accounting Research (CSMAR) database. Specifically, the stock price and stock return are gathered from the "Stock Market Trading" dataset. Financial and governance information is collected from the "Financial Statement" dataset and the "Listed Firm Governance" dataset.

4.3.2 Accounting conservatism measurement

For the empirical analysis, this chapter employs the firm-year conservatism measure, *C_Score*, developed by Khan and Watts (2009) as the proxy for accounting conservatism. This method has been used by Chen et al. (2013) in the context of China. To calculate *C_Score*, the following annual cross-sectional model is estimated first:

$$E_{i,t}/P_{i,t-1}=(\lambda_0+\lambda_1 Size_{i,t}+\lambda_2 Lev_{i,t}+\lambda_3 MB_{i,t})+DR_{i,t}(\kappa_0+\kappa_1 Size_{i,t}+\kappa_2 Lev_{i,t}+\kappa_3 MB_{i,t})$$
$$+R_{i,t}(\mu_0+\mu_1 Size_{i,t}+\mu_2 Lev_{i,t}+\mu_3 MB_{i,t})$$
$$+DR_{i,t}*R_{i,t}(\upsilon_0+\upsilon_1 Size_{i,t}+\upsilon_2 Lev_{i,t}+\upsilon_3 MB_{i,t})+\varepsilon_{i,t} \quad (4.1)$$

[19] ST stands for Special Treatment and refers to the listed firms that have had negative net profits for two consecutive years. *ST refers to the listed firms that have has negative net profits for three consecutive years and thus are probably to be delisted from the stock exchanges.

where E is earnings per share, P is year-end stock price per share, R is yearly buy-and-hold return, and DR is a dummy variable that equals 1 if R is negative and 0 otherwise. *Size* is the natural logarithm of market value of equity, *Lev* is defined as the sum of total debt divided by market value of equity, *MB* is market-to-book ratio. Equation (4.1) is estimated annually. Annual cross-sectional estimation of model (4.1) results in v_0 to v_3 being constant across firms but vary over time. The good news timeliness measure is $\mu_0+\mu_1 Size_{i,t}+\mu_2 Lev_{i,t}+\mu_3 MB_{i,t}$, The measure of incremental timeliness for bad news over good news, or conservatism is $v_0+v_1 Size_{i,t}+v_2 Lev_{i,t}+v_3 MB_{i,t}$, and the total bad news timeliness is $(\mu_0+\mu_1 Size_{i,t}+\mu_2 Lev_{i,t}+\mu_3 MB_{i,t})+(v_0+v_1 Size_{i,t}+v_2 Lev_{i,t}+v_3 MB_{i,t})$. Then, *C_Score* can be calculated for each firm-year as:

$$C\_Score=v_0+v_1 Size_{i,t}+v_2 Lev_{i,t}+v_3 MB_{i,t} \quad (4.2)$$

The firm-level constant coefficients: v_0, v_1, v_2 and v_3 that are obtained from estimation of equation (4.1) are substituted into equation (4.2). Then *C_Score* varies across firms through cross-sectional variation in the firm-year characteristics (*Size*, *Lev* and *MB*).

4.3.3 Institutional investors and ownership measurement

To test the effects of institutional ownership on accounting conservatism (H1), two variables are constructed: The first variable is *Mutual*, which is defined as the percentage of common shares held by domestic mutual funds, and the second variable is *QFII*, which is defined as the percentage of common shares held by QFIIs.

To test the ownership difference between institutional investors and the controlling shareholders on accounting conservatism (H2), this chapter considers three measures to denote the ownership differences following the existing studies (Laeven and Levine,

2007; Attig et al., 2009; Jiang et al., 2018). Firstly, two variables are constructed to represent the difference between the institutional investors' ownership level and that of the controlling shareholders: The first variable is *Mutualdiff*, which is defined as the controlling shareholders' ownership level minus that of the domestic mutual funds. The second variable is *QFIIdiff*, which is defined as the controlling shareholders' ownership level minus the QFIIs' ownership. Secondly, this chapter considers the ratio of institutional investors' ownership to that of the controlling shareholder, and constructs two variables: The first variable is *Mutualratio*, which is the ratio of domestic mutual funds' ownership level to the controlling shareholder's ownership. The second variable is *QFIIratio*, which is the ratio of QFIIs' ownership level to the controlling shareholder's ownership. Thirdly, this chapter considers an ownership dispersion measure, and constructs two variables: The first variable is *Mutualdisp*, which is defined as (the controlling shareholder's ownership - mutual funds' ownership) / (the controlling shareholder's ownership + mutual funds' ownership). The second variable is *QFIIdisp*, which is defined as (the controlling shareholder's ownership - QFIIs' ownership) / (the controlling shareholder's ownership + QFIIs' ownership).

4.3.4 Model specification

To test the effects of institutional investors on firm accounting conservatism, this chapter develops the following regression model:

$$C\_Score_{i,t}=\alpha_0+\alpha_1 Mutual_{i,t}+\alpha_2 QFII_{i,t}+\alpha_3 Asset_{i,t}+\alpha_4 ROA_{i,t}+\alpha_5 Board_{i,t}+\alpha_6 Indep_{i,t}$$
$$+\alpha_7 Leverage_{i,t}+\alpha_8 SOE_{i,t}+\alpha_9 Otherins_{i,t}+Dummy(year)+\varepsilon_{i,t} \quad (4.3)$$

where *C_Score* is the measure of accounting conservatism as defined in section 4.3.2. *Mutual* is the percentage of shares held by domestic mutual funds. *QFII* represents the

percentage of shares held by QFIIs. These two ownership level measures are put in one regression, which enables direct comparison between domestic mutual funds and QFIIs. α_1 and α_2 are used to test Hypothesis H1. According to H1, α_1 is expected to be significantly negative and α_2 is expected to be significantly positive.

Table 4.1 Variable definition

Variables	Definitions
Panel A: Firm accounting conservatism	
C_Score	The same as that defined in the study of Khan and Watts (2009)
Panel B: Institutional ownership	
Mutual	The percentage of shares owned by domestic mutual funds in a firm.
QFII	The percentage of shares owned by QFIIs in a firm
Mutualdiff	The difference between mutual funds' ownership and the controlling shareholder's ownership
QFIIdiff	The difference between QFIIs' ownership and the controlling shareholder's ownership
Mutualratio	The ratio of mutual funds' ownership to the largest shareholder's ownership
QFIIratio	The ratio of QFIIs' ownership to the largest shareholder's ownership
Mutualdisp	(The largest shareholder's ownership-mutual funds' ownership) / (The largest shareholder's ownership + mutual funds' ownership)
QFIIdisp	(The largest shareholder's ownership-QFIIs' ownership) / (The largest shareholder's ownership + QFIIs' ownership)
Panel C: Other variables	
SOE	A dummy variable which is equal to 1 if the firm is ultimately controlled by the government and 0 otherwise
Otherins	The sum of the percentage of shares owned by other institutional investors (banks, insurance companies, social security funds, brokers, entrust companies, and financial companies) in a firm.
Board size (Board)	Nature logarithm of the number of directors on the board
Independent directors (Independent)	Proportion of independent directors on the board
lev	Total debts/total assets in market value
Size	Nature logarithm of total assets in market value
Analyst	The number of stock analysts
Asset	Natural logarithm of firm total assets.
Leverage	The ratio of total debt to total assets
ROA	Net income/total assets
Indexdom	A dummy variable which is equal to 1 if the firm is included into Shanghai 180 Index or Shenzhen Component Index and 0 otherwise.
MSCI	A dummy variable which equals to 1 if a firm is included in MSCI China A inclusion index, and 0 otherwise
NCSKEW	A skewness-based measure of crash risk
Controlling	The percentage of shares held by the largest shareholder

In addition, this chapter also includes several control variables in the model. The variable definitions are listed in Table 4.1. Specifically: *Asset* is the natural logarithm of firm total assets; *ROA* is return on assets, defined as the ratio of net income to firm total assets; *Board* is the natural logarithm of the number of directors on the board; *Indep* is the percentage of independent directors; *Leverage* is the ratio of total debt to total assets; *SOE* is a dummy variable which is equal to one if the firm is controlled by the government and 0 otherwise; *Otherins* denotes the sum of ownership by all the other institutional investors (including banks, insurance companies, pension funds, brokers, entrust companies, social securities, and financial companies). Year dummy variables are included to control for the year fixed effects. To address the issue that institutional ownership and the level of accounting conservatism can be determined jointly by some unobserved firm-specific variables, this chapter estimates equations with firm fixed effects model.

To test Hypothesis H2, equation (4.3) is re-estimated by replacing the ownership of institutional investors with the ownership differences between institutional investors and the controlling shareholder defined in section 4.3.3. Empirically, three difference-based regressions are carried out. In the first regression, *Mutual* and *QFII* are replaced by *Mutualdiff* and *QFIIdiff* respectively. In the second regression, *Mutual* and *QFII* are replaced by *Mutualratio* and *QFIIratio* respectively. In the third regression, *Mutual* and *QFII* are replaced by *Mutualdisp* and *QFIIdisp* respectively. Importantly, to mitigate the concern that these ownership difference measures may just capture the level of controlling shareholder's ownership, this chapter also includes two new control variables in each regression: *Mutuald* and *QFIId*, which indicate the presence of mutual funds and QFIIs respectively. Specifically, *Mutuald* is a dummy variable which equals to 1 if there are mutual funds as shareholders in a firm, and 0 otherwise. *QFIId* is a

dummy variable which equals to 1 if there are QFIIs as shareholders in a firm, and 0 otherwise. The reason that these two dummy variables are included as control variables rather than the ownership level of mutual funds (*Mutual*) and QFIIs (*QFII*), is because of the collinearity issue caused by the fact that the sum of *Mutual* and *Mutualdiff* equals the sum of *QFII* and *QFIIdiff*. All the other control variables have the same definitions with those in equation (4.3).

4.4 Empirical results

4.4.1 Summary statistics

Table 4.2 presents the summary statistics for all variables used in the empirical analyses. Panel A shows the statistics for accounting conservatism. Note that the average level of conservatism (*C_Score*) is 0.049, which is comparable to 0.062 reported by Li (2015) for China's firms. Panel B shows the statistics for institutional ownership. It is noted that among the firms that have domestic mutual funds as shareholders, the average mutual fund ownership is 4.028%. Among the firms that have QFIIs as shareholders, the average QFII ownership is 1.387%. These numbers are quite consistent with existing studies (Firth et al., 2016). The statistics for ownership difference measures show that: the mean values of *Mutualdiff* and *QFIIdiff* are 34.061% and 39.542%, respectively; the mean values of *Mutualratio* and *QFIIratio* are 13.902% and 4.273%, respectively; and the mean values of *Mutualdisp* and *QFIIdisp* are 79.169% and 87.293%, respectively. These statistics suggest that institutional investors are mostly non-controlling shareholders and the large variation of ownership difference measures enables the investigation of the impact of ownership differences on accounting conservatism. Panel C shows the statistics for corporate governance and firm characteristics. Note that the average board size, number of independent directors

and leverage ratio are 9.078, 3.288 and 45.165%, respectively. The average controlling shareholder's ownership is 37.417%, which suggests that there is a high ownership concentration in China's firms. Panel D shows the distribution of the sample firms, of which 51.33% are SOEs and 48.67% are non-SOEs.

Table 4.2 Summary statistics

Variable	Obs.	Firm number	Mean	Std.Dev.	25%	Median	75%	Max
Panel A: Accounting conservatism								
C_score	17,890	2,757	0.049	0.252	0	0.039	0.090	0.650
Panel B: Institutional ownership								
B.1: Full sample								
Mutual (%)	17,890	2,757	2.935	4.074	0	1.140	4.293	43.800
QFII (%)	17,890	2,757	0.151	1.112	0	0	0	60.320
Otherins (%)	17,890	2,757	2.145	3.764	0.160	0.999	2.730	73.030
Mutualdiff (%)	17,890	2,757	34.482	16.537	21.905	32.910	46.170	89.990
QFIIdiff (%)	17,890	2,757	37.266	15.710	24.780	35.625	48.760	89.990
Mutualratio (%)	17,890	2,757	10.127	17.709	0	3.166	12.547	330.198
QFIIratio(%)	17,890	2,757	0.465	2.862	0	0	0	9.765
Mutuldisp(%)	17,890	2,757	84.825	20.856	77.704	93.861	100	100
QFIIdisp(%)	17,890	2,757	92.011	10.880	88.298	96.615	100	100
B.2: Observations of non-zero values of mutual funds/QFIIs' ownership								
Mutual (%)	13,033	2,588	4.028	4.286	0.850	2.465	5.840	43.800
QFII (%)	1,948	882	1.387	3.107	0.390	0.800	1.570	60.320
Others (%)	13,873	2,683	2.773	4.071	0.680	1.610	3.400	73.030
Mutualdiff (%)	13,033	2,588	34.061	16.989	21.059	32.710	46.240	88.900
QFIIdiff (%)	1,948	882	39.542	16.454	26.445	39.130	51.576	88.300
Mutualratio (%)	13,033	2,588	13.902	19.443	0	3.166	12.547	330.198
QFIIratio (%)	1,948	882	4.273	7.681	0.960	2.157	4.668	100
Mutualdisp (%)	13,033	2,588	79.169	21.893	70.020	87.000	95.497	99.989
QFIIdisp (%)	1,948	882	87.293	13.511	82.002	91.704	97.126	99.932
Panel C: Corporate governance and firm characteristics								
Board Size	17,890	2,757	9.078	1.894	8	9	9	19
Independent Directors	17,890	2,757	3.288	0.683	3	3	4	8
Leverage (%)	17,890	2,757	45.165	20.932	28.865	45.769	61.570	89.740
Asset (million)	17,890	2,757	11,600	61,300	1,370	2,810	6,720	2,410,000
ROA (%)	17,890	2,757	4.151	5.341	1.589	3.921	6.796	19.268
Controlling (%)	17,890	2,757	37.417	15.697	24.940	35.760	48.910	89.990
Panel D: Firm type distributions								
	SOEs			Non-SOEs				
Observations	9183(51.33%)			8707(48.67%)				

This table reports the summary statistics of all the variables for the full sample from 2003 to 2005. Panel A is summary statistics for accounting conservatism (*C_Score*). Panel B reports the summary statistics for institutional ownership. Panel C is summary statistics for variables representing corporate governance and firm characteristics. Panel D is summary for firm distributions between state-owned-enterprises (SOEs) and non-state-owned-enterprises (non-SOEs). All the other variables' definitions are the same as in Table 4.1. The value of variables is in terms of China's currency, the RMB.

4.4.2 Institutional investors and accounting conservatism

The results of estimating equation (4.3) are reported in Table 4.3, and validate the first hypothesis (H1). The dependent variable is accounting conservatism (*C_Score*). Table 4.3 reports the results of institutional investors' effects on firm accounting conservatism with and without considering the additional effects of control variables.

Table 4.3 Effects of institutional ownership on accounting conservatism

Dependent variable: C_Score			
	(1)	(2)	(3)
Mutual	-0.138**	-0.081**	-0.151**
	(-2.31)	(-1.98)	(-2.52)
QFII	1.437***	0.332**	1.356***
	(3.56)	(2.38)	(3.51)
Asset		0.002	0.008
		(1.35)	(1.32)
ROA		0.017	0.137***
		(0.50)	(2.61)
Board		-0.018*	-0.038
		(-1.79)	(-1.57)
Independent		-0.023	-0.009
		(-0.70)	(-0.14)
Leverage		-0.165***	-0.201***
		(-16.29)	(-9.99)
SOE		0.009***	-0.024
		(2.64)	(-1.43)
Otherins		0.004	-0.060
		(0.11)	(-0.92)
Constant		0.149***	0.078
		(3.73)	(0.58)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	No	Yes	No
Firm fixed effects	Yes	No	Yes
Observations	17,890	17,890	17,890
R-squared	0.309	0.330	0.347

This table reports the results of institutional investors' ownership on firm accounting conservatism. Dependent variable is *C_score*. Specifically, column (1) shows results of using firm-fixed effects model without including other control variables except for year dummies. Column (2) shows results of using ordinary least square (OLS) model after including a set of control variables as well as year and industry fixed effects. Column (3) shows results of using firm-fixed effects model after including a set of control variables. *Mutual* refers to domestic mutual funds' ownership. *QFII* refers to QFIIs' ownership. All the other variables' definitions are the same as in Table 4.1. Year dummies are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Specifically, column (1) reports the results of using a firm-fixed effects model without controlling other variables except for year dummies. Column (2) reports the results of an Ordinary Least Squares (OLS) regression after including a set of control variables in equation (4.3) as well as industry fixed effects. Column (3) reports the results of using firm-fixed effects model after including all the control variables in equation (4.3). The overall results indicate that the estimated coefficients of the key variables are consistent, so this chapter mainly focuses on the third column for an interpretation.

In column (3), it is observed that the estimated coefficient of *Mutual* (-0.151) is negative and significant at the 5% level (t-value is -2.52). By contrast, the estimated coefficient of *QFII* (1.356) is positive and significant at the 1% level (t-value is 3.51). These results suggest that accounting conservatism is a decreasing function of domestic mutual fund ownership, while it is a positive function of QFII ownership. The results support hypothesis H1 that domestic mutual funds have negative effects on firm accounting conservatism, while foreign institutional investors have positive effects on conservatism.

The results of testing the effects of ownership difference between institutional investors and the controlling shareholders (H2) are reported in Table 4.4. Column (1) shows the results using ownership difference proxies, column (2) shows the results using ownership ratio proxies and column (3) shows the results using ownership dispersion proxies. In column (1), it is found that the estimated coefficient of Mutualdiff is positive and significant at the 1% level (coefficient is 0.181, and t-value is 2.91). However, the estimated coefficient of QFIIdiff is negative and significant at the 1% level (coefficient is -0.246, and t-value is -3.26). Column (2) shows that the coefficient of Mutualratio is -0.029 and is significant at the 10% level (t-value is -1.80), while the

Table 4.4 Effects of ownership difference between institutional investors and controlling shareholders on accounting conservatism

Dependent variable: C_Score			
	(1)	(2)	(3)
Mutualdiff	0.181***		
	(2.91)		
QFIIdiff	-0.246***		
	(-3.26)		
Mutualratio		-0.029*	
		(-1.80)	
QFIIratio		0.251**	
		(2.22)	
Mutualdisp			0.169***
			(2.75)
QFIIdisp			-0.297**
			(-2.45)
Mutuald	0.001	-0.002	-0.001
	(0.15)	(-0.35)	(-0.25)
QFIId	0.014*	0.007	0.007
	(1.79)	(0.80)	(0.82)
Asset	0.009	0.008	0.008
	(1.43)	(1.32)	(1.33)
ROA	0.154***	0.131**	0.130**
	(2.89)	(2.50)	(2.50)
Board	-0.039	-0.038	-0.038
	(-1.59)	(-1.54)	(-1.54)
Independent	-0.011	-0.008	-0.008
	(-0.17)	(-0.13)	(-0.13)
Leverage	-0.199***	-0.203***	-0.203***
	(-9.86)	(-10.07)	(-10.04)
SOE	-0.024	-0.025	-0.024
	(-1.41)	(-1.45)	(-1.45)
Otherins	-0.071	-0.061	-0.059
	(-1.07)	(-0.93)	(-0.90)
Constant	0.090	0.075	0.202
	(0.66)	(0.55)	(1.35)
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Observations	17,890	17,890	17,890
R-squared	0.346	0.346	0.346

This table reports the results of effects of ownership difference to that of the controlling shareholders on firm accounting conservatism. *Mutualdiff* represents the difference between domestic mutual funds' ownership and the controlling shareholder's ownership. *QFIIdiff* represents the difference between QFIIs' ownership and the controlling shareholder's ownership. *Mutualratio* represents the ratio of mutual funds' ownership to the controlling shareholder's ownership. *QFIIratio* represents the ratio of QFIIs' ownership to the controlling shareholder's ownership. *Mutualdisp* represents the difference of ownership between mutual funds and the controlling shareholder, and then scaled by their sum. *QFIIdisp* represents the difference of ownership between QFIIs and the controlling shareholder, and then scaled by their sum. All the other variables' definitions are the same as in Table 4.1. Year dummies are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

coefficient of QFIIratio is 0.251 and significant at the 5% level (t-value is 2.22). In column (3), the coefficient of Mutuldisp is 0.169 and significant at the 1% level, while the coefficient of *QFIIdisp* is -0.297 and significant at the 5% level. These results indicate that domestic mutual funds have greater incentive toward lower conservatism when their ownership is close to that of the controlling shareholders, while QFIIs tend to increase conservatism when their ownership is close to that of the controlling shareholders. The results support hypothesis H2.

Overall, the results are in line with the previous argument. Domestic mutual funds and QFIIs have contrary influence on firm accounting conservatism. The reason is that unlike domestic mutual funds, QFIIs are faced with more cultural challenges in observing managers' actions directly, so QFIIs are more dependent on conservative financial numbers to monitor/ discipline managerial behaviour. Consequently, QFIIs have more demand for conservative accounting. These results are consistent with previous research about the difference in influence of domestic and foreign investors (Ferreira et al., 2017; Kang and Kim, 2010).

4.4.3 Alternative measure of accounting conservatism

To test the robustness of the results, this study also employs the accruals and cash flows (ACF) based accounting conservatism measure, suggested by Ball and Shivakumar (2005). This measurement has also been used in the study by Lara et al. (2009). Ball and Shivakumar (2005) propose the following model:

$$Accr_{i,t}=\beta_0+\beta_1 DCFO_{i,t}+\beta_2 CFO_{i,t}+\beta_3 CFO_{i,t}*DCFO_{i,t}+\mu_{i,t} \quad (4.4)$$

where *Accr* denotes annual total accruals, defined as income before extraordinary items minus cash flow from operations. *CFO* is operating cash flow. *DCFO* is a dummy

variable that equals to 1 if *CFO* is negative and 0 otherwise. *Accr* and *CFO* are both scaled by average total assets. In this model, β_3 represents ACF-based accounting conservatism; a higher value of β_3 corresponds to higher level of accounting conservatism.

In the spirit of Lara et al. (2009), this study includes interactive terms in equation (4.4) and establishes the following model:

$$\begin{aligned} Accr_{i,t} = {} & \theta_0 + \theta_1 DCFO_{i,t} + \theta_2 CFO_{i,t} + \theta_3 CFO_{i,t} * DCFO_{i,t} + \theta_4 Mutual_{i,t} \\ & + \theta_5 Mutual_{i,t} * CFO_{i,t} + \theta_6 Mutual_{i,t} * DCFO_{i,t} + \theta_7 Mutual_{i,t} * CFO_{i,t} * DCFO_{i,t} \\ & + \theta_8 QFII_{i,t} + \theta_9 QFII_{i,t} * CFO_{i,t} + \theta_{10} QFII_{i,t} * DCFO_{i,t} \\ & + \theta_{11} QFII_{i,t} * CFO_{i,t} * DCFO_{i,t} + \mu_{i,t} \end{aligned} \quad (4.5)$$

where all the variables have the same definitions as those in previous equations. θ_7 and θ_{11} reflect the effects of mutual funds and QFIIs on accounting conservatism, respectively. According to H1, θ_7 is expected to be significantly negative, while θ_{11} is expected to be significantly positive.

The results of estimating equation (4.5) are reported in Table 4.5. Column (1) shows results of focusing on ownership level of institutional investors and column (2) to (4) show results of focusing on the difference of ownership by institutional investors to the controlling shareholders. This chapter is mainly concerned with the coefficients of interactive terms that reflect the effects of domestic mutual funds and QFIIs on firm accounting conservatism. In column (1), it is observed that the coefficient of *Mutual*CFO*DCFO* (-12.858) is negative and significant at the 10% level (t-value is 1.87). The coefficient of *QFII*CFO*DCFO* (40.813) is positive and significant at the

Table 4.5 Results of using accrual and cash flows-based measurement for conservatism

Dependent variable: Accr (annual total accruals)				
	Ownership level	Ownership difference		
	(1)	(2)	(3)	(4)
Mutual	1.194***			
	(7.40)			
Mutual* CFO *DCFO	-12.858*			
	(-1.87)			
QFII	0.649			
	(0.76)			
QFII* CFO *DCFO	40.813*			
	(1.90)			
Mutualdiff		-1.089***		
		(-6.83)		
Mutualdiff * CFO *DCFO		12.832**		
		(2.47)		
QFIIdiff		1.425***		
		(7.70)		
QFIIdiff* CFO *DCFO		-16.702***		
		(-2.75)		
Mutualratio			0.210***	
			(5.28)	
Mutualratio* CFO *DCFO			-2.849**	
			(-2.26)	
QFIIratio			0.181	
			(0.95)	
QFIIratio* CFO *DCFO			16.543***	
			(2.77)	
Mutualdisp				-0.098
				(-0.79)
Mutualdisp* CFO *DCFO				11.687***
				(3.71)
QFIIdisp				-0.204
				(-0.86)
QFIIdisp* CFO *DCFO				-17.293***
				(-2.65)
Constant and other controls	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	16,507	16,507	16,507	16,507
R-squared	0.082	0.089	0.078	0.081

This table reports the results of institutional investors' ownership on firm accounting conservatism using accrual and cash flows based measurement. The estimation method is firm fixed effects model. Dependent variable is annual total accruals, defined as income before extraordinary items minus cash flow from operations. *Mutual* refers to domestic mutual funds' ownership. *CFO* is operating cash flow. *DCFO* is a dummy variable which equals to 1 if *CFO* is negative and 0 otherwise. *Accr* and *CFO* are both scaled by average total assets. Constant and the control variables (other less concerned variables in equation (4.4)) are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

10% level (t-value is 1.90). These results provide evidence consistent with Table 4.3, that domestic mutual funds have negative effects on firm accounting conservatism, while QFIIs have positive effects on accounting conservatism. With similar analysis, the results of the interactive terms in columns (2) to (4) suggest that domestic mutual funds have increased incentive to lower the accounting conservatism level when their ownership level is relatively close to that of the controlling shareholder, while QFIIs have a stronger demand for accounting conservatism when their ownership level is closer to that of the controlling shareholder. Overall, the previous findings are robust when using accrual and cash flows-based measurement for conservatism.

4.4.4 Endogeneity concern

The previous results using a firm fixed effects model can address endogeneity issues caused by the omitted unobservable firm-level variables. However, there is still an endogeneity issue: sample selection bias because institutional investors may tend to invest in those firms that implement a particular accounting conservatism policy. Therefore, to address this endogeneity issue and check the robustness of the previous results, this study employs the propensity score matching (PSM) method and the Heckman two-stage model to re-estimate the parameters of the empirical models.

First, previous regressions are re-estimated using a PSM sample. A sample is constructed in which the treatment sample and control sample are matched by some similar firm characteristics. In this matching process, for each firm-year observation in the treatment sample (i.e., observations with both domestic mutual funds and QFIIs as shareholders), this chapter identifies an observation in the control sample (i.e., observations with neither domestic mutual funds nor QFIIs as shareholders) which has

Table 4.6 Results of addressing endogeneity issues using PSM matching sample

Panel A: Comparison of firm characteristics between treatment firms and control firms			
	(1)	(2)	(3)
	Treatment firms	Control firms	Difference
Asset	22.455	22.474	-0.019(-0.40)
ROA	0.061	0.059	0.002(0.84)
Board	2.329	2.337	-0.008(-1.10)
Independent	0.365	0.364	0.001(0.29)
Leverage	0.453	0.459	-0.006(-0.91)
SOE	0.633	0.648	-0.015(-0.85)
Others	0.020	0.019	0.001(0.40)

Panel B: Results of using PSM matching sample				
Dependent variable: C_Score				
	Ownership level		Ownership difference	
	(1)	(2)	(3)	(4)
Mutual	-0.388*			
	(-1.93)			
QFII	1.263*			
	(1.72)			
Mutualdiff		0.307*		
		(1.76)		
QFIIdiff		-0.349*		
		(-1.69)		
Mutualratio			-0.080*	
			(-1.79)	
QFIIratio			0.276*	
			(1.77)	
Mutualdisp				0.220**
				(2.14)
QFIIdisp				-0.380*
				(-1.95)
Constant and controls	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	3,174	3,174	3,174	3,174
R-squared	0.317	0.303	0.311	0.310

This table shows the results of addressing endogeneity issues using PSM matching sample. Specifically, Panel A shows the comparison of firm characteristics between firms which have mutual funds and QFIIs as shareholders and control firms. T-tests are conducted to test for differences in mean values between firms which have mutual funds and QFIIs as shareholders and control firms. The t-statistics are reported in parentheses in Column (3). Panel B shows the regressions results of using PSM matching sample. Constant and all the control variables in equation (4.3) are included in each regression and all the other variables' definitions are the same as in Table 4.1. The t-statistics (in parentheses) in other regressions are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

the same/nearest propensity score of firm characteristics including firm size, ROA, board size, proportion of independent directors, leverage ratio, the type of ultimate

controlling shareholder and ownership of other institutional investors. Second, the matching sample obtained from PSM method is used to re-estimate the equations. The results of using the PSM method are reported in Table 4.6. Panel A compares firm characteristics between the treatment sample and the control sample. It is suggested that these characteristics are unlikely to drive the difference of accounting conservatism in firms with and without domestic mutual funds or QFIIs as shareholders. This validates the construction of matching sample. Panel B shows the regression results using this matching sample. All the results for the key variables are consistent with those in Table 4.3, which confirms that the main results are robust.

In addition, this chapter also uses the Heckman two-stage method to address any potential sample selection bias issue. The first stage of the procedure involves an analysis where the ownership of domestic mutual funds and QFIIs are separately regressed against the control variables from equation (4.3). To meet the exclusion restrictions, instrumental variables are included in each regression that are not included in the second-stage regression. The regression regarding domestic mutual funds includes an index-inclusion dummy variable (*Indexdom*). *Indexdom* is equal to one if the firm is included in the Shanghai 180 Index or the Shenzhen Component Index, and 0 otherwise. In the regression regarding QFIIs, this method follows Luong et al. (2017) and includes an international index inclusion, the MSCI China A inclusion index. A dummy variable (*MSCI*) is constructed which equals to 1 if a firm is included in the MSCI China A inclusion index, and 0 otherwise. The inverse mills ratio ($Lambda_{Mutual}$ and $Lambda_{QFII}$) is obtained from the first stage and is included as an independent variable in the second stage regression analysis of accounting conservatism. First stage results are given in columns (1) and (2) of Table 4.7 and the variables of interest of the

Table 4.7 Results of addressing endogeneity issues using Heckman two-stage method

	First stage		Second stage			
Dependent variable	Mutual	QFII	C_Score			
	(1)	(2)	(3)	(4)	(5)	(6)
Indexdom	0.008***					
	(2.66)					
MSCI		0.001**				
		(2.27)				
Mutual			-0.283***			
			(-4.62)			
QFII			1.260***			
			(3.53)			
Mutualdiff				0.216***		
				(4.01)		
QFIIdiff				-0.672**		
				(-2.40)		
Mutualratio					-0.041***	
					(-3.04)	
QFIIratio					0.241***	
					(2.59)	
Mutualdisp						0.176***
						(2.92)
QFIIdisp						-0.287**
						(-2.44)
$Lambda_{Mutual}$			3.592**	20.966	-3.714**	-3.696*
			(2.52)	(1.39)	(-2.44)	(-1.90)
$Lambda_{QFII}$			-2.718***	13.736***	1.383***	1.382
			(-3.17)	(11.88)	(12.08)	(1.26)
Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,890	17,890	17,890	17,890	17,890	17,890
F-value	28.88	5.89				
R-squared	0.154	0.009	0.356	0.353	0.353	0.353

This table shows the results of addressing endogeneity issues using Heckman two stage method. Specifically, column (1) and column (2) are the results of the first stage. Column (3) and column (4) are results of the second stage. *Indexdom* is a dummy variable which equals to 1 if a firm is included in Shanghai 180 Index or Shenzhen Component Index, and 0 otherwise. *MSCI* is a dummy variable which equals to 1 if a firm is included in MSCI China A Inclusion Index, and 0 otherwise. Constant and all the control variables in equation (4.3) are included in each regression and all the other variables' definitions are the same as in Table 4.1. The t-statistics (in parentheses) in other regressions are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

second stage are given in columns (3) to (6) of Table 4.7. From the first stage, it is found that domestic mutual funds are more likely to invest in firms which are included in the Shanghai 180 Index or the Shenzhen Component Index, and QFIIs are more

likely to invest in firms which are included in the MSCI China A inclusion index. Then, in the second-stage results, it is observed that most of the coefficients for $Lambda_{Mutual}$ and $Lambda_{QFII}$ are significant, indicating that sample selection bias and the endogeneity issue might exist in the previous analysis. After correcting for these endogeneity issues, the ownership level of domestic mutual funds still has negative effects on accounting conservatism, while QFIIs' ownership level has positive effects. Both the negative effects of domestic mutual funds and the positive effects of QFIIs are stronger when their ownership is closer to that of the controlling shareholders.

4.5 Additional analysis and further evidence

4.5.1 The effects of state ownership

China's firms can be classified into state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs) based on the identity of the controlling shareholders. SOEs are firms ultimately controlled by the government, and non-SOEs are firms which are controlled by non-government entities. It is expected that the influence of institutional investors on accounting conservatism would be weaker in SOEs than in non-SOEs for the following reasons: Under the current Chinese political system, the appointment of managers in SOEs is usually decided by administrative authorities (Fan et al., 2013), so managers are more likely to make decisions following government policies. Therefore, managers' behaviour is less likely to be monitored or affected by other non-controlling shareholders. Consequently, the direct monitoring by institutional investors would be less efficient in SOEs. Therefore, the negative effects of domestic mutual funds on accounting conservatism may become weaker in SOEs. In addition, SOEs are under severe control from the government, which makes them more like government institutions that have multiple objectives such as maintaining social

stability plus political objectives, rather than maximizing shareholder value. In this case, firm policies, including the adoption of conservative accounting are less likely to be influenced by other shareholders. Thus, in this section it is proposed that the effects of both domestic mutual funds and QFIIs on firm accounting conservatism would be weaker in SOEs than in non-SOEs.

Table 4.8 Effects of state ownership

Dependent variable: C_Score						
Sample	SOEs			Non-SOEs		
	(1)	(2)	(3)	(4)	(5)	(6)
Mutualdiff	0.019			0.337***		
	(0.20)			(4.14)		
QFIIdiff	-0.070			-0.443***		
	(-0.61)			(-4.81)		
Mutualratio		0.016			-0.062***	
		(0.71)			(-2.78)	
QFIIratio		0.238*			0.429**	
		(1.81)			(2.01)	
Mutualdisp			0.116			0.333***
			(1.48)			(3.03)
QFIIdisp			-0.264*			-0.573***
			(-1.73)			(-2.63)
Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,183	9,183	9,183	8,707	8,707	8,707
R-squared	0.334	0.334	0.334	0.406	0.405	0.405

This table shows the results of examining the effects of state ownership. The estimation method is firm fixed effects model. Dependent variable is *C_score*. Specifically, columns (1) to (3) are results of testing SOEs. Columns (4) to (6) are results of testing non-SOEs. Constant and all the control variables in equation (4.3) are included in each regression and all the other variables' definitions are the same as in Table 4.1. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

To provide evidence of this, the baseline regressions are repeated among SOEs and non-SOEs. The results of key variables are reported in Table 4.8. Columns (1) to (3) are results using the SOE subsample, and columns (4) to (6) are results using the non-SOE

subsample. It is observed that all the coefficients of key variables are significant in the non-SOEs subsample; while in the SOE subsample the ratio and dispersion proxies are significant only at the marginal level, which suggests that both the negative effects of domestic mutual funds and the positive effects of QFIIs are more pronounced in non-SOEs. These results support the main argument of this chapter that the requirement of institutional investors for conservative accounting is subject to the identities of the controlling shareholders, and is also dependent on the efficiency of direct monitoring. Another possible reason for the weaker effects of institutional investors on accounting conservatism may be that SOEs are favoured by the government with soft credit constraints and government funding support, so creditors have less concern about the default risk of SOEs (Chen et al., 2010). As the monitoring initiative from creditors is weaker, the incentives for domestic mutual funds to require accounting conservatism become stronger. Overall, the results are in line with the literature about the weakening effects of state ownership on institutional investors' impact in China (Firth et al., 2010; Huang and Zhu, 2015).

4.5.2 The effects of ownership concentration

Based on the main argument and previous evidence, the effects of institutional investors on accounting conservatism are subject to their ability to directly monitor the behaviour of managers, and more importantly are also influenced by their contestability of the controlling shareholders. It is thus expected that the influence of institutional investors would be more significant when there is a higher level of ownership concentration. Therefore, this chapter primarily proposes that the main results regarding the influence of institutional investors would be more significant in firms with a higher level of ownership concentration. To provide evidence of this, the sample is divided into

two groups: one group includes firms with higher level of ownership concentration, and the other group includes firms with lower level of ownership concentration. A firm is identified as with higher level of ownership concentration if the controlling shareholder's ownership is larger than the mean value of the full sample, and a firm is identified as with lower level of ownership concentration if the controlling shareholder's ownership is less than the mean value.

Table 4.9 Effects of ownership concentration

Dependent variable: C_Score						
Sample	Firms where ownership is more concentrated			Firms where ownership is less concentrated		
	(1)	(2)	(3)	(4)	(5)	(6)
Mutualdiff	0.269***			0.147*		
	(2.70)			(1.68)		
QFIIdiff	-0.428***			-0.156		
	(-3.25)			(-1.19)		
Mutualratio		-0.087**			-0.027	
		(-1.98)			(-1.52)	
QFIIratio		0.540*			0.139	
		(1.94)			(0.99)	
Mutualdisp			0.359**			0.078
			(2.33)			(1.02)
QFIIdisp			-0.610**			-0.120
			(-2.01)			(-0.79)
Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,948	8,948	8,948	8,942	8,942	8,942
R-squared	0.329	0.329	0.329	0.374	0.374	0.374

This table shows the results of examining the effects of ownership concentration. The estimation method is firm fixed effects model. Dependent variable is *C_score*. Columns (1) to (3) are the results of using firms where ownership is more concentrated as the sample. Columns (4) to (5) are the results of using firms where ownership is less concentrated as the sample. Constant and all the control variables in equation (4.3) are included in each regression and all the other variables' definitions are the same as in Table 4.1. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

The baseline regressions are repeated for the firms with the higher and lower levels of ownership concentration. The results are presented in Table 4.9. The structure is consistent with that of Table 4.8. Columns (1) to (3) are the results of using firms where ownership is more concentrated. Columns (4) to (6) are the results of using firms where ownership is less concentrated. It is observed that all the results for key variables are significant in firms with the higher level of ownership concentration, while almost all of the coefficients in firms with lower level of ownership concentration are not significant, except that the coefficient of *Mutualdiff* is just marginally significant (t-value is 1.68). These results indicate that the negative effects of domestic mutual funds on accounting conservatism are more significant when ownership is more concentrated. These results support the previous argument and further verify that the demand by mutual funds in China for accounting conservatism differs from that in developed countries.

4.5.3 The effects of firm information asymmetry

Based on the argument above, the effects of institutional investors on firm accounting conservatism are subject to their direct monitoring capacity and effectiveness. It is difficult for institutional investors to monitor managers' behaviour directly when information asymmetry is severe (Prendergast, 2002). Consequently, institutional investors may rely more on financial numbers for monitoring. It is proposed that the negative effects of domestic mutual funds on conservatism would be less significant in firms where there is more severe information asymmetry. Because the presence of analysts could improve the information environment (Healy and Palepu, 2001), analyst coverage is used here as the measurement of information asymmetry. Firms covered by more stock analysts are believed to be more informationally transparent.

To provide evidence, the sample firms are divided into two groups: one group includes firms that have less severe information asymmetry, and the other group includes firms that have more severe information asymmetry. Firms of which the analyst number is more than the mean value of the sample are identified as having lower level of information asymmetry. Firms of which the analyst number is less than the mean value are identified as having higher level of information asymmetry. The baseline regressions are then repeated among these two groups. The results are reported in Table 4.10. Consistent with the structure of Table 4.8, columns (1) to (3) are results

Table 4.10 Effects of information asymmetry

Dependent variable: C_Score						
Sample	Firms with more analyst coverage			Firms with less analyst coverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Mutualdiff	0.316***			0.051		
	(4.26)			(0.34)		
QFIIdiff	-0.433***			-0.081		
	(-3.74)			(-0.52)		
Mutualratio		-0.056***			-0.010	
		(-2.61)			(-0.30)	
QFIIratio		0.181			0.451*	
		(1.35)			(1.77)	
Mutualdisp			0.203***			0.200
			(3.03)			(1.51)
QFIIdisp			-0.309**			-0.393
			(-2.33)			(-1.51)
Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,843	8,843	8,843	8,705	8,705	8,705
R-squared	0.469	0.468	0.468	0.312	0.313	0.312

This table shows the results of examining the effects of firm information asymmetry. The estimation method is firm fixed effects model. Dependent variable is *C_score*. Specifically, columns (1) to (3) are results of testing firms which have more analyst coverage. Columns (4) to (6) are results of testing firms which have less analyst coverage. Constant and all the control variables in equation (4.3) are included in each regression and all the other variables' definitions are the same as in Table 4.1. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

for firms with lower of information asymmetry, and columns (4) to (6) are results for firms with higher information asymmetry. It is observed that all the coefficients of domestic mutual funds measures are significant at the 1% level in firms with more analyst coverage, while they are not significant in firms with less analyst coverage. This indicates that the negative effects of domestic mutual funds' ownership on accounting conservatism are stronger when there is a lower level of information asymmetry. In addition, the more significant results of QFIIs in firms with more analyst coverage reflect that decreased information asymmetry also facilitates QFIIs in positively promoting accounting conservatism.

Overall, these results are consistent with the primary argument that as there is a lower level of information asymmetry in firms where there is more stock analyst tracking, and hence the direct monitoring of domestic mutual funds is more efficient. Thus, domestic mutual funds are more likely to rely on direct monitoring over managers' behaviour than on financial numbers, thus their negative influence on conservatism becomes stronger.

4.5.4 Alternative explanation of domestic mutual funds' effects

Based on the results above, this chapter argues that domestic mutual funds have negative effects on accounting conservatism. The reason is that domestic mutual funds are able to improve the corporate governance level by directly monitoring managers' behaviours, hence they are less dependent on financial numbers. However, there could be an alternative explanation of domestic mutual funds' negative effects on accounting conservatism in that domestic mutual funds may collude with the controlling shareholders in lowering the conservatism level for their private benefit. To test this alternative explanation, this chapter examines the effects of domestic mutual funds on

stock price crash risk. If domestic mutual funds collude with the controlling shareholders to not adopt conservative accounting, then bad news will be less likely to be recognized in a timely manner, leading to a higher probability of crash risk (Jin and Myers, 2006). Therefore, the presence of domestic mutual funds could increase the level of stock price crash risk. Empirically, this chapter employs a skewness-based measure of crash risk (*NSKEW*) proposed by Chen et al. (2001). Specifically, for each firm *j*, in year *t*, *NSKEW* is calculated by taking the negative of the third moment of firm-specific weekly returns for each sample year and dividing it by the standard deviation of firm-specific weekly returns raised to the third power, the higher the value of *NSKEW*, the higher possibility of stock price crash risk:

$$NSKEW = -[n(n-1)^{3/2}\sum w^{3}_{i,t}]/[(n-1)(n-2)(\sum w^{2}_{j,t})^{3/2}] \quad (4.6)$$

The baseline regressions are then repeated by replacing *C_Score* with *NSKEW*. The results are reported in Table 4.11. The coefficient of *Mutual* is negative (-3.585) and statistically significant at the 1% level (t-value is -17.52), which suggests that the presence of domestic mutual funds in a firm could significantly reduce the crash risk of stock price. In addition, the significant positive coefficients of *Mutualdiff* and *Mutualdisp*, and the significant negative coefficient of *Mutualratio* indicate that when domestic mutual funds hold closer ownership to that of the controlling shareholder, the stock price crash risk turns lower. The result is contradictory to the proposed alternative explanation that mutual funds lower accounting conservatism by colluding with the controlling shareholder in impeding information disclosure. Thus, the presence of large controlling shareholders and efficient direct monitoring reduces the requirement of mutual funds for conservatism.

Table 4.11 Effects of institutional investors on stock price crash risk

Dependent variable: NCSKEW				
	(1)	(2)	(3)	(4)
Mutual	-3.585***			
	(-17.52)			
QFII	0.106			
	(0.10)			
Mutualdiff		3.712***		
		(17.48)		
QFIIdiff		-4.062***		
		(-16.48)		
Mutualratio			-0.666***	
			(-11.26)	
QFIIratio			0.373	
			(1.12)	
Mutualdisp				0.979***
				(4.65)
QFIIdisp				-0.621
				(-1.52)
Constant and controls	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	17,801	17,801	17,801	17,801
R-squared	0.099	0.100	0.092	0.095

This table reports the results of institutional investors' ownership on firm stock price crash risk. The estimation method is firm fixed effects model. Dependent variable is *NCSKEW*. Constant and all the other variables' definitions are the same as in Table 4.1. Year dummies are included. The t-statistics (in parentheses) are computed using robust standard error clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

4.6 Conclusion

Firm accounting conservatism has plenty of benefits such as reducing agency problems and mitigating information asymmetry. The increasingly important role that institutional investors play in capital markets motivates this investigation of their effects on firm accounting conservatism in the emerging market of China.

Using China's listed firms from 2003 to 2015 as a sample and employing the *C_Score*, developed by Khan and Watts (2009) as the proxy for accounting conservatism, this chapter compares the effects that domestic mutual funds and QFIIs have on firm accounting conservatism. The main findings are as follows: First, unlike

the US market, domestic mutual funds negatively influence the degree of accounting conservatism, while QFIIs positively influence the degree of accounting conservatism. The reason is that compared with QFIIs, domestic mutual funds are more able to monitor managers' actions through other direct monitoring mechanisms such as site visits, so they are less dependent on accounting conservatism and their ownership could lower the level of conservatism. Second, when institutional investors' ownership is close to that of the controlling shareholder, domestic mutual funds' negative effects on conservatism become stronger. However, when QFIIs' ownership is close to the controlling shareholders their positive effects are stronger. Third, the negative effects of domestic mutual funds and positive effects of QFIIs on accounting conservatism become weaker in: state-owned enterprises, firms that have a lower level of ownership concentration, and firms with higher information. The results are robust when using alternative measurement of accounting conservatism and after addressing endogeneity issues.

Overall, the main results support the view that institutional investors' demands for accounting conservatism are subject to their identities as well as their ownership difference from the controlling shareholders' ownership.

Chapter 5 Conclusions

This thesis is motivated by the substantial development of institutional investors in the Chinese capital market during the last two decades. Since the ownership in China's firms is highly concentrated and controlling shareholders usually play a dominant role in deciding a firm's policies, this thesis aims to examine whether institutional investors could play an effective monitoring role in China's listed firms, and whether their role could be influenced by the large controlling shareholders' level of ownership. To achieve these objectives, this thesis first investigates the effects of institutional investors on CEO pay-performance relationship. Secondly, this thesis examines how institutional investors' contestability of controlling shareholders influences firm innovation and gives a better understanding of the role of institutional investors in monitoring managers' long-term investment decisions. Finally, this thesis examines whether institutional investors require a high level of accounting conservatism. The findings from this thesis are as follows:

5.1 Effects of institutional investors on CEO pay-performance relationship

In chapter 2, this thesis examines the effects of institutional investors on the CEO pay-performance relationship. A strong CEO pay-performance relationship is believed to be a good way to mitigate the agency problem between managers and shareholders. As one of the most important types of shareholders, institutional investors are sophisticated and professional in processing information, so they may be able to monitor managers' behaviours by strengthening the relationship between CEO pay and performance.

Since the behaviours of institutional investors are subject to their identities, this thesis is interested in the different effects that domestic mutual funds and QFIIs have on the CEO pay-performance relationship. This thesis provides empirical evidence that domestic mutual funds and QFIIs have different effects on the CEO pay-performance relationship. Specifically, since domestic mutual funds are professional in processing information and are more informed about the investee firms, they are able to exert effective monitoring on managers and thereby have positive effects on the CEO pay-performance relationship. However, the effects of QFIIs on the CEO pay-performance relationship are insignificant. The reason is that QFIIs are faced with more information asymmetry due to cultural and language barriers, which makes it less straightforward for QFIIs to monitor managers effectively.

By considering the difference between the ownership of institutional investors and the controlling shareholders, this thesis further finds that the positive effects that domestic mutual funds have on CEO pay-performance are stronger when their ownership is closer to that of the controlling shareholders. This finding implies that under the high level of ownership concentration in emerging markets, the behaviours of institutional investors are not only determined by their ownership level, but more importantly, are determined by the difference between their ownership and that of the controlling shareholders. When mutual funds' ownership level is getting closer to that of the controlling shareholders, they are able to contend with the controlling shareholders and improve corporate governance by uniting other minority shareholders.

In addition, this thesis further finds that the effects of domestic mutual funds vary across firms. The positive effects of domestic mutual funds on CEO pay-performance relationship are more significant in non-SOEs than SOEs, reflecting that severe

government control restrains the monitoring role of other shareholders. , This thesis also finds that since corporate governance is weak when a firm has weak industry tournament, domestic mutual funds have more incentives to strengthen the CEO pay-performance relationship. In more developed regions the monitoring effects of domestic mutual funds are more significant due to the better investor protection and reduced information asymmetry.

Overall, this thesis finds that QFIIs and domestic mutual funds have heterogeneous effects on the CEO pay-performance relationship. The effective monitoring of domestic mutual funds is not only relevant to their ownership level but also to the difference of their ownership to that of the controlling shareholder. The effectiveness of domestic mutual funds' monitoring role is subject to the institutional background including the severity of government intervention and weak investor protection.

5.2 Effects of institutional investors' contestability on firm innovation

Chapter 3 examines how institutional investors' contestability of the controlling shareholders influences firm innovation. In the past decade, China's economy has been growing substantially and innovation has been and remains a crucial driver. During the same period, institutional investors have also developed significantly. As an important type of shareholder, institutional investors usually hold diversified portfolios, so they have incentives to encourage investment in innovative projects which are risky but with possibility of high returns. Therefore, institutional investors have positive effects on firm innovation performance. However, the ownership is highly concentrated in China's firms and the controlling shareholders' dominant role in deciding firm policies may influence institutional investors' behaviours. Thus, the impact of institutional investors may be subject to their ability to contest with the controlling shareholders.

The main conclusion drawn from the empirical results is that when domestic mutual funds' ownership level is closer to that of the controlling shareholders, domestic mutual funds' contestability of the controlling shareholders is strengthened and firm innovation can be improved. However, QFIIs do not have such contestability effects. This can be attributed to the more severe information asymmetry faced by QFIIs due to the cultural and language barriers, which make it difficult and costly for QFIIs to contest with the controlling shareholders. By contrast, domestic mutual funds are able to contend with the controlling shareholders in improving firm innovation when their ownership is close to that of the controlling shareholders.

Furthermore, this thesis provides evidence that the influence of domestic mutual funds' contestability on firm innovation is weaker in SOEs. The reason is that the appointment of CEOs in SOEs is under the control of the government, so they tend to make decisions following government instructions, rather than on the benefits of shareholders. In addition, the effects of mutual funds' contestability on innovation are also stronger in firms with non-politically connected CEOs, firms facing more competitive markets, and firms with less analyst coverage. These results are consistent with the view that domestic mutual funds' contestability affects firm innovation by alleviating managers' career concerns.

To conclude, the influence of institutional investors on firm innovation is not only determined by their ownership level, but is also subject to the difference in their ownership level to that of the controlling shareholders, i.e. contestability. Moreover, the effects of contestability are also heterogeneous across different types of institutional investors. Mutual funds' contestability has positive effects on firm innovation while QFIIs have no such contestability effects.

5.3 Demand of institutional investors for accounting conservatism

Accounting conservatism is believed to be a good governance device for shareholders. It is found in Chapter 2 and Chapter 3 that the monitoring of domestic mutual funds on managers is more effective than QFIIs in terms of improving CEO pay-performance sensitivity and improving firm innovation performance, therefore it is interesting to further look into their effects on accounting conservatism. In Chapter 4, this thesis discusses the effects of domestic mutual funds and QFIIs on firm accounting conservatism.

This thesis finds that since domestic mutual funds are able to monitor managers' behaviours through direct ways such as strengthening the CEO pay-performance relationship and improving firm innovative investment, their dependence on financial numbers is weak. Consequently, domestic mutual funds require less conservative accounting of the investee. Another important reason for domestic mutual funds' reduced demand for conservatism is that the main agency problem in China exists between the controlling shareholders and minority shareholders rather than between managers and shareholders. By contrast, QFIIs are more reliant on financial numbers to conduct monitoring, so they require a higher level of accounting conservatism. Using the same method, testing the influence of the controlling shareholders finds that the negative effects of domestic mutual funds and the positive effects of QFIIs on accounting conservatism are both stronger when their ownership is closer to that of the controlling shareholders. In addition, further evidence indicates that the demand of institutional investors for accounting conservatism is stronger in firms where the controlling shareholders are non-state entities, there is a higher level of ownership concentration and less severe information asymmetry.

To summarise, institutional investors' demand for accounting conservatism is subject to their identities. Domestic mutual funds do not require conservative accounting while QFIIs do. The negative effects of domestic mutual funds on accounting conservatism vary across firms with different types of controlling shareholders, different levels of ownership concentration and information asymmetry.

5.4 Summary and implications

In summary, the role that domestic and foreign institutional investors play is heterogeneous in China. Domestic mutual funds have information advantages, are more informed of the local investee firms and are sophisticated in processing information. These factors facilitate their monitoring on managers, including a significantly positive impact on the CEO pay-performance relationship, and are able to contest with the controlling shareholders by improving firm innovation output. As a result of the efficient and significant direct monitoring, domestic mutual funds are less dependent on financial numbers to overlook managers' self-interest behaviours. However, QFIIs are faced with more severe information asymmetry, caused by cultural and language disadvantages, which constrains their monitoring role in the investee firms. Consequently, QFIIs are not able to significantly improve CEO pay-performance sensitivity, and they do not have contestability effects in terms of improving firm innovation output. Therefore, they have more incentive to demand conservative accounting to monitor/ discipline the behaviour of managers.

The high ownership concentration in China's firms has an impact on the monitoring role of institutional investors. To be specific, the behaviours of institutional investors are not only determined by their ownership level, but more importantly, are determined by the difference in ownership between them and the controlling shareholders. When

institutional investors are close in ownership to the controlling shareholders, domestic mutual funds tend to contend with the controlling shareholders and hence improve corporate governance, while QFIIs' behaviours are more likely to be captured by the controlling shareholders. The role of institutional investors in the investee firms is subject to institutional characteristics, particularly the level of ownership concentration, which is higher in emerging markets.

An important implication of this thesis is that in China, due to the unique culture and the existence of various dialects, foreign institutional investors and domestic institutional investors have different incentives and behaviours. Foreign institutional investors' effects are constrained in terms of improving corporate governance level and improving firm policies for the following four reasons: First, QFIIs hold a relatively lower level of ownership compared with domestic mutual funds. Therefore, it is very hard for QFIIs to monitor managers' behaviours or compete with the controlling shareholders. Second, as discussed in Chapter 1, QFIIs are faced with strict regulations from the government on ownership level and the overall investment quota. The ownership held by a single QFII in a listed firm is not allowed to exceed 10%, and the total ownership of all the QFIIs in a listed firm is not allowed to exceed 30%. Therefore, QFIIs have very limited ability to influence the decision makings of a firm. Third, QFIIs are owned by foreigners who usually have a different culture from the local culture in China, such as the uncommon used language and relationship-based economy, which increase the information asymmetry level faced by QFIIs (Chakravarty et al., 1998; Kang and Kim, 2010; Liu et al., 2014; Ferreira et al., 2017). This further makes it difficult for QFIIs to monitor managers. Fourth, QFII portfolios are more diversified so that they are able to move their capital from China to another market when they feel risky, while domestic mutual funds are less likely to do so. Therefore, QFIIs may not

exert direct monitoring on managers or have no significant effects on firm overall corporate governance or firm innovation. Thus, QFIIs are more likely to be captured by the controlling shareholders and thereby comply with the controlling shareholders' decisions. Overall, due to the lack of ability of QFIIs to monitor managers or compete with the controlling shareholders, it is hard for QFIIs to have significant effects on corporate governance or firm policies. Practically, these findings provide a reference for regulators to make policies, in particular the insignificant monitoring role of foreign institutional investors calls for the further release of restrictions over their investment in China. In addition, this thesis also provides information to help individual investors make appropriate investment decisions.

5.5 Limitations and suggestions for future research

It is acknowledged that this research has some limitations. One limitation is sample selection. The sample used in this thesis includes all China's A-share listed firms. The case is unclear for unlisted firms due to the limited data available. Future research in this area can provide further insights into unlisted firms by conducting surveys to collect the required information. In addition, as domestic mutual funds do not have investment in China's B-share firms, the sample does not cover these firms. However, QFIIs do have a level of ownership of China's B-share firms, so future research on QFIIs' effects can include B-share firms.

The other limitation is the measurement of CEO compensation in Chapter 2, where CEO pay only includes cash pay (including salary, bonus and other cash compensation). Some existing literature measures CEO compensation as all components of CEO wealth including stock options, grants and restricted stocks grants. However, the conclusions may not be influenced since there are very few listed firms in China (127 firms in the

sample) using stock options and restricted stocks incentives. Future research on institutional investors and CEO incentives can focus on CEO total wealth including stock options and restricted stocks.

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